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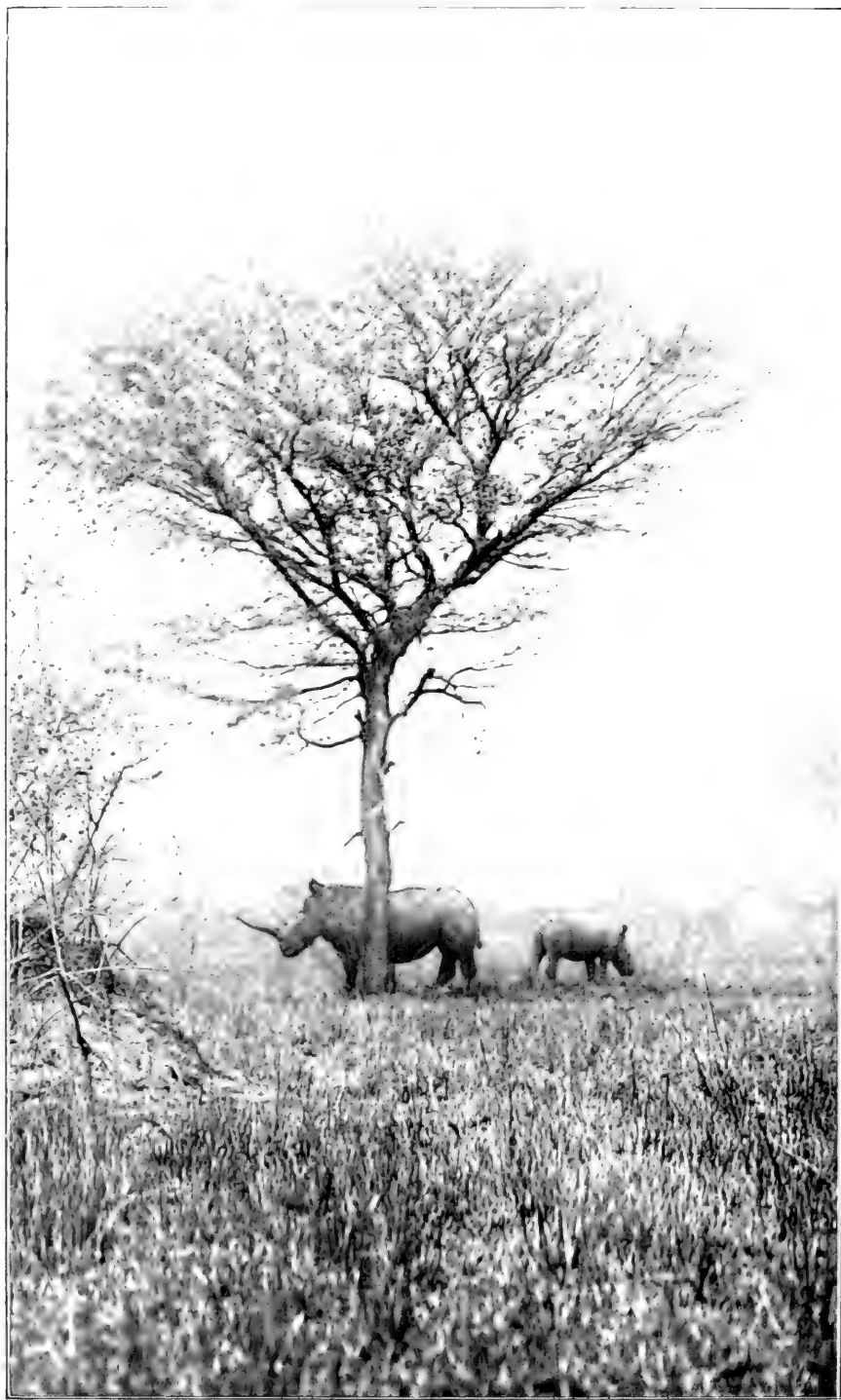
MARY CYNTHIA DICKERSON, *Editor*

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THE SQUARE-MOUTHED RHINOCEROS

The white or square-mouthed rhinoceros is now found only in a game preserve in South Africa and on a narrow stretch of territory along the west bank of the Upper Nile

# The American Museum Journal

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## THE SQUARE-MOUTHED RHINOCEROS

BY THEODORE ROOSEVELT

*Colonel Roosevelt has presented to the American Museum two specimens of the rare White Rhino, and gives to the JOURNAL from his personal experiences and observations in Africa the following account of this great horned beast of the Lado. On the arrival of the skins at the Museum, work will begin at once on the task of preparing and mounting them for exhibition.*

ON our trip in Africa for the Smithsonian, in addition to the series of specimens of big game for the Smithsonian itself, we also prepared a few skins of the largest and rarest animals for other collections: a head of the white rhinoceros for Mr. Hornaday's noteworthy collection, a bull elephant for the University of California, two cow elephants and a bull and cow of the white rhino for the American Museum of Natural History. I was especially anxious to get this pair of white rhinos, because the American Museum is in my own city, because my father was one of its founders and because my admiration is great for the work of the men who have raised this institution to its present high position. The skins of the two cow elephants were prepared by Carl Akeley, with whom I had gone after them; the other specimens were preserved by Edmund Heller and R. J. Cunninghame as a labor of love.

The white rhinoceros is, next to the elephant, the largest of existing mammals. There are three groups of existing rhinoceros: the two-horned species of Africa, the one-horned species of the Indian region and the little Sumatran rhinoceros — the three separate stems of ancestry going back at least to early Pliocene and probably to Miocene times. At one time rhinos of many different kinds and covering the widest variety of form and habit abounded in America, and in Europe species lasted to the days of paleolithic man.

There are two wholly distinct kinds in Africa, differing from one another as much as the moose does from the wapiti. They are commonly called the black and the white; but as in fact they are both of a dark slate hue, it is better to call the former the hook-lipped and the latter the square-mouthed. They intergrade in size, but the square-mouthed averages bigger and longer-horned. The hook-lipped or common black kind is still plentiful in

\* The illustrations are used through the courtesy of Charles Scribner's Sons.



*From a photograph, copyright, by Kermit Roosevelt*

many places from Abyssinia to the Zambezi; it is a browser and feeds chiefly on twigs and leaves. The white or square-mouthed kind is now found only in a game preserve in South Africa and on a narrow stretch of territory along the west bank of the Upper Nile. It is purely a grazer.

In its range the square-mouthed rhino offers an extraordinary example of discontinuous distribution. It was originally known from South Africa, south of the Zambezi, and was believed to exist nowhere north of that river. Then, when it had been practically exterminated in South Africa, it was rediscovered far to the north beyond the equator. In the immense extent of intervening territory it has never been found.

We spent over a month in the Lado, the present habitat of this huge sluggish ungulate. We collected a good series of specimens, nine in all — bulls and cows and one calf. Of course, we killed none save those absolutely needed for scientific purposes. All told we saw thirty or forty individuals and Kermit got some fine photographs, the first ever taken of living members of the species. Their eyesight was so dull and their brains so lethargic that time and again we got within a score or so of feet and watched individuals as long as we cared to.

They drank at night, either at the Nile or at some pool, and then moved back, grazing as they went, into the barren desolation of the dry country. About nine o'clock or thereabouts they lay down, usually under the scanty shade of some half-leafless thorn tree. In mid afternoon they rose and grazed industriously until sundown. But as with all game, they sometimes varied their times of resting, eating and drinking. Ordinarily we found the bulls singly and the cow along with her calf; but occasionally three or four would go together. Cow herons frequently accompanied them, as they do elephants and buffaloes, perching unconcernedly on their heads and bodies.

They were not difficult to get as our trackers followed their trail with little difficulty; and they seemed less excitable and bad-tempered than their hook-lipped cousins, although on occasion they charge with determination, so that a certain amount of care must be exercised in dealing with them.





*From a photograph, copyright, by Kermit Roosevelt*

A HERD OF ELEPHANT IN AN OPEN FOREST OF HIGH TIMBER

Photograph taken from the vantage point of the limb of a tree five or six feet from the ground and twenty-five yards distant. The elephant and the square-mouthed rhinoceros are the largest of existing mammals. Colonel Roosevelt has presented two elephants to the Museum in addition to his valuable gift of a bull and cow of the white rhino



A DINOSAUR MUMMY

This dinosaur (*Trachodon annectens*) discovered in 1908 by Charles H. Sternberg of Kansas differs from all others previously found in having the skin present, drawn tightly over the skeleton. The new knowledge gained strengthens the theory of aquatic habit for dinosaurs of this genus. The Dinosaur Mummy was discovered in Wyoming and was purchased by the Museum through the Morris K. Jesup Fund.

## A DINOSAUR MUMMY

By Henry Fairfield Osborn

TWO years ago, through the Jesup Fund, the Museum came into possession of a most unique specimen, discovered in August, 1908, by the veteran fossil hunter Charles H. Sternberg of Kansas. It is a large herbivorous dinosaur belonging to the closing period of the Age of Reptiles, and is known to palæontologists as *Trachodon*, or more popularly as the "duck-billed dinosaur."

The skeleton, or hard parts of these very remarkable animals has been known for over forty years, and a few specimens had preserved with them small areas of the impressions of the epidermal covering, but it was not until the discovery of the Sternberg specimen that a knowledge of the outer covering of these dinosaurs was gained. It appears probable that in a number of cases these priceless skin impressions were mostly destroyed in removing the fossil specimens from their surroundings because the explorers were not expecting to find anything of the kind. Altogether seven specimens have been discovered in which these delicate skin impressions were partly preserved, but the "trachodon mummy" far surpasses all the others, as it yields a nearly complete picture of the outer covering.

The reason the Sternberg specimen (*Trachodon annectens*) may be known as a dinosaur "mummy" is that in all the parts of the animal which are preserved (i. e. all except the hind limbs and the tail) the epidermis is shrunken around the limbs, tightly drawn along the bony surfaces and contracted like a great curtain below the chest area. This condition of the epidermis suggests the following theory of the deposition and preservation of this wonderful specimen, namely: that after dying a natural death the animal was not attacked or preyed upon by its enemies and the body lay exposed to the sun entirely undisturbed for a long time, perhaps upon a broad sand flat of a stream in the low-water stage; the muscles and viscera thus became completely dehydrated, or desiccated by the action of the sun, the epidermis shrank around the limbs, was tightly drawn down along all the bony surfaces, and became hardened and leathery; on the abdominal surfaces the epidermis was certainly drawn within the body cavity, while it was thrown into creases and folds along the sides of the body, owing to the shrinkage of the tissues within. At the termination of a possible low-water season, during which these processes of desiccation took place, the "mummy" may have been caught in a sudden flood, carried



DUCK-BILLED DINOSAURS

Fossil reptiles with spreading webbed feet, compressed tail and duck-like bill, all of which indicate a more or less aquatic existence. Compare with restoration, p. 10

The jaws are provided with a marvelous grinding apparatus composed of a complex of more than two thousand separate teeth



PORTION OF SKIN FROM TRACHODON MUMMY

This reptile had neither scales nor bony covering, but a thin epidermis made up of tubercles of two sizes, the larger size predominating on surfaces exposed to the sun

down the stream, and rapidly buried in a bed of fine river sand intermingled with sufficient elements of clay to take a perfect cast or mold of all the epidermal markings before any of the epidermal tissues had time to soften under the solvent action of the water. In this way the markings were indicated with absolute distinctness, and as the specimen will soon be mounted in a glass case, the visitor will be able by the use of a hand glass to study even the finer details of the pattern, although of course there is no trace either of the epidermis itself, which has entirely disappeared, or of the pigmentation, or coloring, if such existed.

The discovery of this specimen discloses the fact that although attaining a height of fifteen to sixteen feet and a length of thirty feet, the trachodons were not covered with scales or a bony protecting arma-



DUCK-BILLED DINOSAUR. A PRELIMINARY RESTORATION BY CHARLES R. KNIGHT

ture, but with dermal tubercles of relatively small size, which varied in shape and arrangement in different species, and that not improbably associated with this varied epidermal pattern there was a varied color pattern. The theory of a color pattern is based chiefly upon the fact that the larger tubercles concentrate and become more numerous on all those portions of the body exposed to the sun, that is, on the outer surfaces of the fore and hind limbs, and appear to increase also along the sides of the body and to be more concentrated on the back. On the less exposed areas, the under side of the body and the inner sides of the limbs, the smaller tubercles are more numerous, the larger tubercles being reduced to small, irregularly arranged patches. From analogy with existing lizards and snakes we may suppose, therefore, that the trachodons presented a darker appearance when seen from the back and a lighter appearance when seen from the front.

The thin character of the epidermis as revealed by this specimen favors also the theory that these animals spent a large part of their time in the water, which theory is strengthened by the fact that the diminutive fore limb terminates not in claws or hoofs, but in a broad extension of the skin, reaching beyond the fingers and forming a kind of paddle. This marginal web, which connects all the fingers with each other, together with the fact that the lower side of the fore limb is as delicate in its epidermal structure as the upper, certainly tends to support the theory of the swimming rather than the walking or terrestrial function of this fore paddle, as indicated in the accompanying preliminary restoration that was made by Charles R. Knight working under the writer's direction. One is drawn in the conventional bipedal, or standing posture, while the other is in a quadrupedal pose, or walking position, sustaining or balancing the fore part of the body on a muddy surface with its fore feet. In the distant water a large number of the animals are disporting themselves.

The designation of these animals as the "duck-billed" dinosaurs in reference to the broadening of the beak, has long been considered in connection with the theory of aquatic habitat. The conversion of the fore limb into a sort of paddle, as evidenced by the Sternberg specimen, strengthens this theory.

This truly wonderful specimen, therefore, nearly doubles our previous insight into the habits and life of a very remarkable group of reptiles.



WARRIORS WITH SHIELDS, SINGING AS THEY MARCH

## INDUSTRY AND ART OF THE NEGRO RACE

THE EXHIBITION IN THE MUSEUM'S AFRICAN HALL ENFORCES NEW IDEAS  
AS TO THE CAPACITIES OF THE NEGRO RACE AND REVEALS THE  
GROUND ON WHICH ARE BASED SOME NEW THEORIES  
REGARDING THE NEGRO'S RELATION TO CIVILIZATION

*By Robert H. Lowie*

Decorative illustrations from African Hall frescoes by Albert Operti

WHILE a few years ago all the Museum's ethnological material from Africa could have been conveniently placed in a few cases, the acquisition of two unusually large collections from the Congo seemed to warrant the installation of a hall especially devoted to African





ethnology. The great preponderance of material from the Congo as compared with other regions of Africa made necessary the allotment of an apparently disproportionate amount of space, a large rectangular area in the center being set aside for this purpose. There is a certain measure of justification, however, for the prominence thus given to a single region. The Congo embraces within its boundaries tribes representing with special clearness the development of negro culture as uninfluenced by external causes; it includes not only divisions of the Pygmy race representing per-

haps the lowest of cultural stages to be found in Africa, but also a number of Bantu-speaking negroes whose artistic work may be fairly taken as representative of the capacities of the African natives.

The plan of arrangement was designed to be, as nearly as possible, geographical. The as yet uninstalled collections from parts north, east, south and west of the Congo are to be placed ultimately in corresponding positions with reference to the large central rectangle; within this central area devoted to the Congo a similar geographical plan was actually followed as rigidly as the nature of the material and other practical conditions permitted. Thus, the visitor entering the African Hall is confronted by a row of cases exhibiting material from the southern Congo, while a series of mats from the same district is stretched in frames above. Passing to the east, he finds along the eastern border of the central area the material from the eastern Congo, while the space, as yet unoccupied, between this



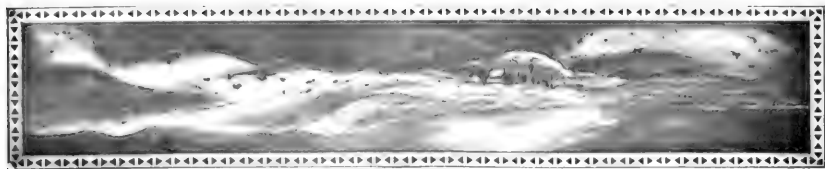
Portion of transparency in African Hall. The shaved head and abundant neck and ear ornaments are typical of East Africa

row of cases and the windows is to be dedicated to East Africa. Here, as throughout the perimeter of the Congo area, spears, shields, battle axes and other specimens are grouped on pillars or fastened in frames above the cased material from the same territory.

A rather novel device was hit upon to illustrate phases of native life such as can scarcely ever be represented adequately by actual specimens. Thus, the pastoral life of the Masai is not clearly shown by an exhibition of milk jugs, and the crossing of a river on a native bridge cannot be very vividly presented to a visitor by a cased section of the bridge. Similarly, the necessarily piecemeal installation of garments and objects of personal adornment from some district hardly permits the construction of a picture of the fully-dressed warrior. Accordingly, there was obtained a large series of standard photographs illustrating various aspects of African culture; from these, colored enlargements on glass were prepared, and placed in the lower window frames as transparencies. These transparencies, which embrace in scope the entire African continent, supplementing the material on exhibition, are likely to convey to the general public a clearer and more impressive picture of aboriginal African culture than could otherwise be hoped for.

So far as the exhibition of the material itself is concerned, especial care was taken to emphasize certain broad features which



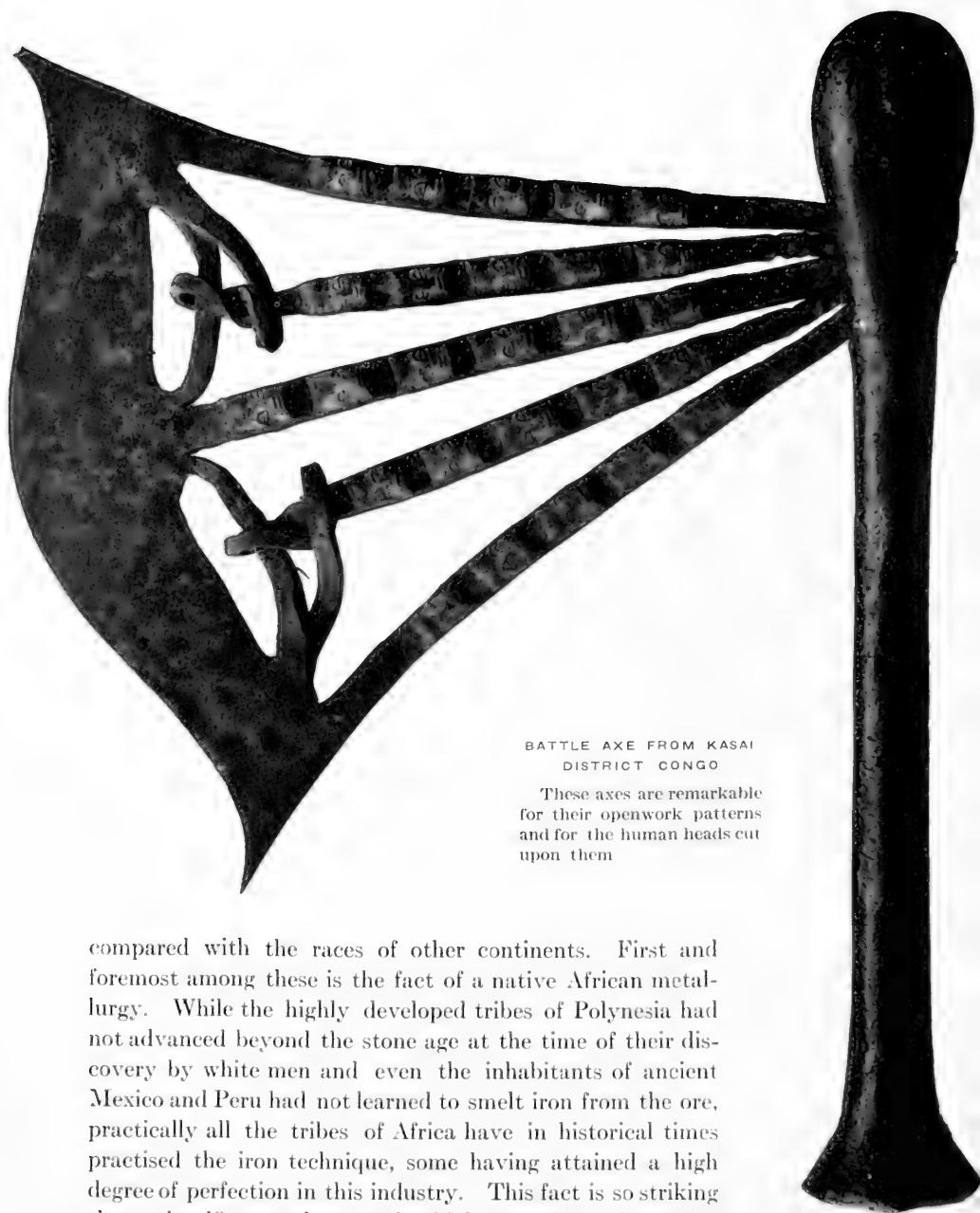


the average layman is not likely to associate with the African aborigines, but which are nevertheless in the highest degree characteristic of them as



SMALL SECTION OF AFRICAN HALL

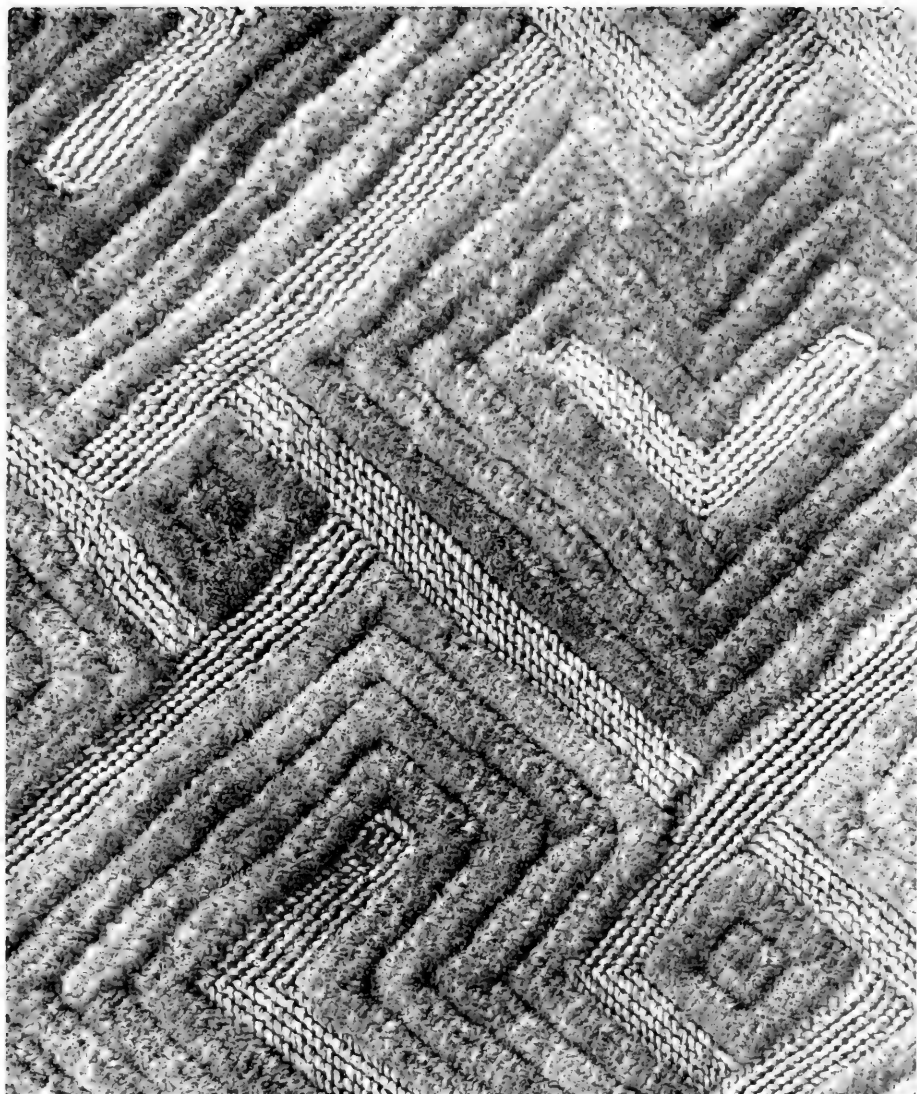
Editorial Note: Frescoes along the gallery above, a frieze spanning the distance from pillar to pillar and colored transparencies in the windows produce a strong decorative effect in addition to correlating vividly the technical exhibits in the cases with African life and customs. These plans for the hall are accredited to Director Hermon C. Bumpus who also is the originator of the idea carried out in this and in other halls as to the apportionment of space. That is, the space along the east and west sides of the African Hall from north to south is destined to indicate the relative geographical distribution of the various tribes around the great heart of Africa, the Congo. So that in walking the length of the hall along the right, and back along the left, one may pass in review African industry, art and tribal customs as if actually traveling north from the Cape of Good Hope to the Mediterranean, east of the Congo, and south again, west of the Congo — in other words, from the Bushmen to the tribes of the Nile and from the Sahara tribes to the Hottentots. Such a plan gives a forceful and natural arrangement for the disposition of any collection of heterogeneous materials from a region. The installation of the collections in the cases is the work of Robert H. Lowie, Assistant Curator in the Department of Anthropology.



BATTLE AXE FROM KASAI  
DISTRICT CONGO

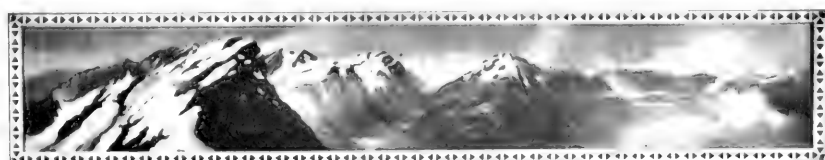
These axes are remarkable  
for their openwork patterns  
and for the human heads cut  
upon them

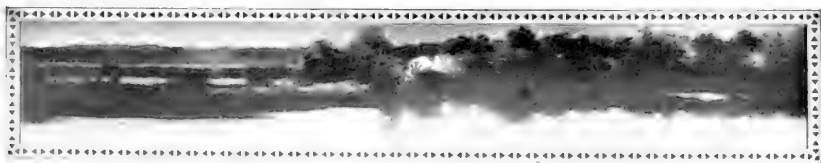
compared with the races of other continents. First and foremost among these is the fact of a native African metallurgy. While the highly developed tribes of Polynesia had not advanced beyond the stone age at the time of their discovery by white men and even the inhabitants of ancient Mexico and Peru had not learned to smelt iron from the ore, practically all the tribes of Africa have in historical times practised the iron technique, some having attained a high degree of perfection in this industry. This fact is so striking that scientific travelers of the highest rank, such as Dr. Schweinfurth and Professor von Luschan, have advanced the theory that the African negroes were the originators of the technique and transmitted it through the intermediation of other peoples to the ancestors of our civilized



BAKUBA PILECLOTH AN EXAMPLE OF PLUSH WEAVING

The men weave the cloth from the fibres of the raphia palm, then the women embroider upon it geometrical patterns and give a final shaving which produces a plush like fabric





nations of to-day. Should this theory prove tenable, it is obvious that a complete revision of popular beliefs as to the negro's relation to modern civilization would be a necessary consequence. However this may be, it was clearly essential to emphasize metal-work in the African Hall. A group of negro blacksmiths, which had been in the possession of the Museum for a number of years, was given a conspicuous place in the northern section of the Hall, and in the decorative panels overhanging the cases, as well as on the pillars marking the perimeter of the Congo area, African spears and battle-axes, throwing-knives and scimitars were made to predominate.

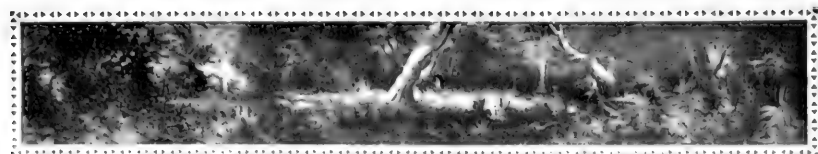
Another phase of activity which is not usually associated with the African race has underlying it a strong development of the æsthetic sense, and the new exhibits are likely to carry conviction on this point. The number of different types of musical instruments utilized by the negroes contrasts favorably with their relative scarcity as exhibited in other halls. Far more imposing, however, is the array of decorative woodwork and pilecloth



CARVED WOODEN VASE, KASAI DISTRICT

In this exceptionally beautiful piece the more usual angular design in imitation of the interlacing strands of basketwork has been transformed into a pattern of gracefully curved lines.





*Photograph by Rev. G. W. Stuhlbrand*

CONGO PYGMIES IN THE DEATH DANCE

from the Kasai District of the Congo, the patterns of which occasionally rise to classic beauty of composition. Even the ironwork, aside from its excellence from a utilitarian point of view, is at times equally impressive by the almost incredible virtuosity of its ornamentation. The exhibits are thus likely to temper current misunderstandings as to the capacities of the negro race and to carry home to a wider public some of the most fundamental and now firmly established conceptions of ethnological science.



## A NEW ORIOLE FROM MEXICO

By Frank M. Chapman

**A**MONG the most interesting results attending the Museum's expedition to Mexico to secure material for a habitat group of tropical birds, was the discovery of a new species of oriole. The bird is most nearly related to our orchard oriole, which prior to this time has been distinguished by the fact that it had no close relatives, its rich chestnut colors being strikingly unlike the orange dress of most members of the genus *Icterus*.

The new bird was discovered by Mr. Louis Agassiz Fuertes, the artist of the expedition, and in view of this fact, as well as in recognition of his invaluable services to ornithology, it has been named, in the January issue of the *Auk*, the official organ of the American Ornithologists' Union, *Icterus fuertesi*. The colored plate of the new bird, drawn by Mr. Fuertes, is here reproduced through the courtesy of the Union.

The discovery of this very distinct new species in a region the bird life of which was supposed to be well-known, illustrates how extremely restricted is the range of many tropical birds, and at the same time emphasizes our comparative ignorance of the bird life of tropical America.

Four specimens of Fuertes's oriole were secured. They were all taken on the banks of the Tamesí River, some thirty-five miles in an air-line and seventy-five by water from Tampico on the Gulf coast of Mexico. The members of the Museum expedition were here the guests of Mr. Thomas H. Silsbee, on the sugar plantation of Paso del Haba, and the new birds were found only in the scrubby second-growth which has appeared on the banks of the river from which the forest had been cleared in establishing the plantation. Whether they also inhabited the somewhat scanty growth away from the vicinity of the river, we did not ascertain since the surprising abundance of birds in the river-forest claimed all our attention.

At this time (April 3-9, 1910) the great yellow-headed parrots (*Amazona oratrix*) so popular as cage-birds, together with somewhat smaller red-headed parrots (*Amazona viridigenalis*) and two species of paroquets were beginning to nest, and several pairs had selected hollow limbs in the trees about our camp. There were also trogons (*Trogon ambiguus*), motmots (*Myiophobus lessoni*), chachalaccas (*Ortalis vetula mealli*) and many other birds characteristic of the tropics, most of which were at the northern limit of their range. The region, therefore, has an especial interest as the nearest point to New York City at which a well-developed tropical fauna can be found.





ICTERUS FUERTESI CHAPMAN  
ADULT MALE AND FEMALE  
(Two-thirds natural size)



## AROUND THE WORLD FOR THE MUSEUM\*

*By Roy C. Andrews*

THROUGH the coöperation of the Bureau of Fisheries at Washington with the Director of the American Museum, I received a temporary appointment on the United States ship Albatross to do collecting, principally of mammals and birds, on an expedition to Borneo and the islands of the Dutch East Indies. By agreement, the types of new species and series of duplicates were to go to the National Museum, the remainder of the material collected being reserved for the American Museum. This was in the summer of 1909 and the Albatross at the time was cruising in Philippine waters.

Leaving New York in August, 1909, I sailed from Seattle to Hong Kong by way of Yokohama and after waiting four days in Hong Kong for a typhoon to subside, left just in time to meet a second storm about halfway across the China Sea. At Manila I learned that the Albatross was on its way from Zamboanga and that almost ten days must elapse before she would be ready to leave for the southern trip; consequently the time seemed opportune to make a short expedition to the island of Mindoro for the purpose of ascertaining the whereabouts of a great number of whales which had been reported as coming ashore near Calapan. Consequently I went to Mindoro and made arrangements for transportation the next day in a native canoe to the spot where the whales were supposed to be. That evening, however, telegrams were received from Manila stating that a typhoon was on the way. All of the white people in the little village and many of the natives hurried to the old Spanish fort and prepared to spend the night there. It was well that this was done, for the typhoon struck the north end of the islands with tremendous violence and for two days we were practically kept prisoners in the old fortress. It was a most interesting experience and the disagreeable features were very shortly forgotten after the typhoon had ceased. All attempts to reach the whales, however, were useless because of the heavy sea that was running and the tremendous surf pounding the shore all along the north coast.

Returning to Manila I found the Albatross already there and Captain McCormack kindly consented to take the ship to Calapan. The trip resulted in disappointment, however, because the bones of the whales had

\* This article, an itinerary and general statement of the collecting trip made for the Museum in 1909 and 1910 by a representative of the Department of Mammalogy, will be followed in later issues of the JOURNAL by detailed reports of work and places visited.

become so softened by being buried with the flesh in the damp sand that only two skulls and a few other parts of skeletons were available.

The Albatross finally left Manila in late October and after a three days' trip reached Sibattick Island, British North Borneo. Here I had my first experience collecting in a tropical forest. Great white camphor-wood trees, some stretching up nearly two hundred feet, and the "Kayu Rajah," or king-tree, equally as high, were hung with vines and creepers forming a tangled network. Palms were interspersed here and there throughout the forest and banana trees were growing in every little clearing. Bird notes could be heard, subdued because of the great height of the trees and sometimes drowned in the shrilling of myriads of locusts and beetles.

The Albatross then visited the North Celebes. In Limbe Strait I collected a number of monkeys, a pig and one of the rare ursine phalangers together with a good series of birds among which were four large hornbills. Another stop, Ternate, was interesting as the place where many of the paradise birds from New Guinea are marketed and sent to Paris and London for millinery purposes.

We got to Makassar for Christmas and were most hospitably received by the Governor and the European residents of the town. It was here that I met His Excellency, Baron Quarles de Quarles, Governor of the Celebes, who has a splendid museum of his own illustrating the anthropology and ethnology of the East Indian native tribes. He became interested in our work and very generously presented to the American Museum a collection of ethnological material, otherwise impossible to obtain.

The Albatross returned to the Philippine Islands in January and exchanging the Filipino members of the crew for white sailors, put out again in heavy weather for Formosa and the Loo-Choo Islands, and then made straight for Nagasaki, Japan. Here we were received with great cordiality by the Governor and the American Consul and obtained information resulting in a trip to Shimonoseki where permission was secured from officials of the Oriental Whaling Company to visit their stations for the purpose of studying and collecting Cetacean material.

Returning to Nagasaki, I definitely arranged to leave the Albatross and eventually forwarded much of my material to Shimonoseki. First I went to the whaling station at Shimidzu on the island of Shikoku. So few whales were taken at this station, however, that I transferred to Oshima, where were taken a splendid blue or sulphur-bottom whale 79 feet in length, the jaws alone of which were nineteen feet long, a sei or sardine whale 46 feet long and a killer of 26 feet length. After being carefully crated these were put on board a schooner and sent to Shimonoseki, whence they were transferred to the Hamburg-American liner *Aragonia* for New York. With

them was also shipped a killer skeleton which had been taken in Korea and presented by the whaling company with the other material.

The Museum was desirous of securing a large sperm whale and with this end in view I went to the station at Aikawahama, three hundred miles north of Yokohama. Here I remained for more than three months going out on the whaling ships and studying the different specimens as they were brought in. Four species of large whales were taken and there were exceptional opportunities to obtain valuable scientific data, but although some twelve sperm whales had been killed, none were over 47 feet in length. I had almost despaired when finally Captain Fred Olsen of the whaleship



Two of the 27 cases of whale skeletons from Japan. The larger crate has a space measurement of 26 tons and contains a sperm whale which yielded 20 barrels of spermaceti

Rekkusu Maru brought in a specimen 60 feet long and fortunately none of the bones had been broken by the four harpoons used in the capture.

During the time spent at this station, a finback whale 70 feet in length and also ten porpoises of four different species were secured, one of which is apparently new to science. After considerable difficulty the enormous crates containing the skulls and bones of the whales were transported to a village some twelve miles away, loaded onto a Nippon Yusen Kaisha liner and sent to Yokohama, thence being shipped direct to New York by the steamship *Welsh Prince*.

The courtesy shown to me as a representative of the American Museum

of Natural History was very great both by the president and officials of the Oriental Whaling Company and by the various station masters and captains of the ships. Not only did the company present all of the skeletons to the Museum, but also gave every facility for prosecuting scientific work.

This whaling company is the largest in the world, notwithstanding that the industry in Japan dates back only about fifteen years. Superior methods are used and by making both whale flesh and blubber serve as food, the product of the industry is disposed of in the most profitable way.

After seeing the skeletons safely on board the *Welsh Prince* I left Japan, going directly to Egypt, touring afterward through Italy, Austria, Germany, Belgium, France and England to inspect the zoölogical gardens and museums and do comparative work on the study collections in the various institutions.

### THE MEDICINE PIPE

ITS RITUAL OF PRAYERS AND SONGS GIVEN TO THE MUSEUM IN VALUABLE  
PHONOGRAPH RECORDS

*By Clark Wissler*

IN the exhibit for the Plains Indians stands a magnificent medicine pipe. This is one of the most important medicine bundles of the Blackfoot Indians; when belonging to them the pipe and its accessories were never unwrapped except with the appropriate ceremony and never spoken of lightly. That it should be exposed to your gaze from day to day, as it now is, would shock even the most hardened iconoclast of that tribe. There once came to visit the Museum a mixed-blood Piegan, long schooled and practiced in the ways of the white man; but when looking at the exhibit for the Plains Indians he shrank away from the sight of that great pipe and asked that we allow him to walk on the other side of the hall. To give reasons why these people so feel toward this object would be a long story and belongs rather to the scientific interest and purpose of the Museum, while our present fancy takes us in another more human direction.

That this pipe can be exhibited here is another testimonial to the devotion of The-Bear-One. We had hoped to record fully the ritual and other information pertaining to the medicine pipe as a contribution to the Museum's investigation of Plains culture and, knowing that our friend was formerly a medicine-pipe keeper, selected him to give that information. He, like others of his kind, freely gave us such information as we asked for, told us how the first pipe was handed down by the Thunder, how the bundle

must always be opened at the first sound of thunder in the spring, how it may be opened by a vow or to cure the sick, and how it must be cared for. Yet we wanted more; the ritual for that pipe contains prayers and songs in a fixed order which we wished to record with a phonograph.

Before our friend was confronted with this ordeal we made him acquainted with the phonograph. The instrument was not new to him for every trader at his agency owned one; on trade days they ground out the latest and best in solo, chorus and orchestra, all no doubt a great din to his Indian ears. That the machine talked like a white man he knew well enough, it was but in keeping with other performances of that remarkable race. One day when he called we explained that we wished to record his voice, to have it always to keep in memory of him and hoped he would consent to sing a song into the horn. He complied rather indifferently, selecting a common song of his people. At the end he leaned back in his chair with the unmistakable air of one who listens. We adjusted the reproducer to the cylinder just taken and turned on the motor. He listened rather curiously to the scraping and buzzing that always preceded the bursting tone of the record but when the first phrases of his own song struck his ear there was a flash of light from his eyes that we can never forget. That the machine could speak the language of the Indian was, he said, almost beyond belief. He asked many questions, but was particularly anxious to know how we came by such a machine. The fact that its originator was yet alive impressed him.

He sang other songs for us and always asked to hear his records when he called. He even went so far as to repeat certain prayers we heard him offer up at the sun dance, but cautioned us that such were not to be trifled with and asked that they be not repeated to his or other Indian ears. At last as time went on, we found ourselves working out with him the ritual for a medicine pipe and when we came to the songs, we suggested the phonograph. He considered the matter for some minutes, then in a low but distinct voice made a long prayer to the spirits of all the departed medicine pipe keepers, the import of which was that he was about to do something questionable, but that our purpose was noble and honorable and not a mockery, and that he begged their indulgence to do this thing. He then announced himself ready to proceed. Now there are about a hundred songs in this ritual, too many for one sitting; so we stopped before half of them were recorded. He seemed quite enthusiastic and promised to return on the morrow to his task.

We were happy for we could see in our possession the long line of wax records bearing the ritual of this great pipe — but on the morrow he came not. On the following day he appeared, announcing that he would sing

no more in the phonograph for he had received a warning. Even as he was singing that day a messenger was galloping in to call him home where his wife had been seized with a hemorrhage, something she had never before experienced. Was it not sufficient that this affliction should come on his home the moment he began this serious business and to him of all others, the greatest "blood-stopper" of the tribe? Hence, not again. We talked long and earnestly of bleeding and its causes. We learned from him that it was a bad case of nose-bleeding that gave him his fright. We produced a bit of surgical cotton and explained its virtues when properly manipulated and offered our assistance at the next attack. He tucked some of the cotton in his belt and went his way.

We worked with other Indians on less difficult subjects and waited. At last The-Bear-One surprised us by announcing that he would proceed with the phonograph. He gave no explanations and we asked for none. Fortunately, nothing occurred to interrupt him and the ritual was completed.

It was some time after this that we made our first formal request of The-Bear-One. We asked his aid to secure a medicine pipe bundle. He made no comment beyond stating that since we now had the ritual and the songs the request was reasonable.

We did not see him for a long time after this, but heard it talked about that The-Bear-One now had a pipe bundle in his tipi and had had a dream in which he was asked to give it to a certain white man, also seen in the dream. To these Indians, dreams are sacred and not to be disregarded; hence, though to their minds a terrible fate threatened the pipe, there seemed no remedy. The hope was that the certain white man would shrink from the responsibility. One day our friend sent for us. When seated in his tipi he recounted our request, his dream, and pointed to the bundle. The transfer was arranged and finally executed without hindrance. The event was something of a scandal in the tribe, but nothing was said before us and the prestige and medicine power of our friend was too great to permit calling him to task. Yet of talk there was no lack. Strange to say no Indian seemed to question the reality of the alleged dream; but while The-Bear-One never broke faith with us to our knowledge and ever seemed sincere, we never felt quite certain about that dream.

So when you look upon this pipe do not forget the hopes and fears of many that once clustered around it; that even its story is not yet told; that though The-Bear-One has become as the dust of the plains, the works of his hand and even his voice are here.



## RELATION BETWEEN HABIT AND STRUCTURE IN THE INSECT WORLD

*By Frank E. Lutz*

WE do not know whether an insect has a given structure as an adaptation to its habits of life or whether the habits have been developed to conform to changed structures. Following the work of Darwin, most biologists believed that the greater number of structures arose gradually either through the natural selection of variations favorable to a given habit or by the effect of use, and the term "adaptation" has come to imply as much. Specifically, this would mean that a grasshopper has long powerful hind legs either because of the fact that its ancestors with the longest, strongest hind legs were the best jumpers and so were most successful, or through continued use by its ancestors of their hind legs for jumping.

In this connection two things must be said. First, not a single instance of the inheritance of the effect of use or disuse upon anatomical characters has ever been experimentally proved, while there are numerous cases of experimental negative evidence. Second, in recent years many cases have been recorded of large heritable variations arising suddenly. Among these is that of abnormally large hind legs in no less common an animal than the domestic cat. Now when these "rabbit cats" run they do so by a series of leaps. The large hind legs are not adapted (in the technical sense) to jumping but the habit of jumping is adapted to the large hind legs. A cockroach's flat body enables it to live in cracks and crevices. If its body were of such shape that it could not, it would live elsewhere as its relatives do. Natural selection doubtless accounts for the failure of many variations to be perpetuated, but doubtless many variations are perpetuated either because the eliminating action of natural selection is dodged by a change of habits, that is by habit becoming adapted to structure; or because they are of neutral value fitting in with the habits of their possessors in the struggle for existence — that is, natural selection does not effect them at all.

There is another class of characters. They are very striking but no use can ever be imagined for them. To this class belong most of the patterns of coloration, many of the horns and spines, and the unusual development of some parts of the body. These are explained as having come about either through orthogenesis or the effect of the environment or in other ways which are too complex to be mentioned here. If this be true, is it not probable that some, at least, of the characters which are used by insects

are merely used either because the insect is forced to, as in the case of the long hind legs for jumping, or because it finds it convenient, as living in crevices when the shape of the body enables it to do so?

Therefore, let us be on the safe side and use the non-committal phrase, "the relation between habit and structure," rather than the committal one, "adaptation of structure to habit." Examples of such relation are legion. The large wings and slender bodies of dragon flies make them supreme in the air but clumsy on the ground. The ground beetles have legs of such length and suppleness that they are enabled to run swiftly. The "electric light bug" whose home is the water has paddle-shaped legs and a keel-shaped body. The water striders skate over the surface of ponds and streams by virtue of slender, hair-covered feet which do not break the surface film. The mole cricket burrows in the ground by using the spade-shaped front legs. The mantis catches its prey with its toothed front legs. The scalpel-like ovipositor of the katydid slits leaves and the bar-like one of the cricket makes holes in the ground for the reception of eggs.

The subject is most fascinating and therefore one in which we are apt to lose our judicial balance. At any rate, however the relations come about, they are not only numerous and striking but, as is shown by the dominance of insect life, effective.

### FORT LEE DINOSAUR

*By W. D. Matthew*

THE discovery of a fossil reptile skeleton, probably a dinosaur, at Fort Lee almost within the city of New York is of exceptional interest to New Yorkers. It was found on the red shales which underlie the Palisades and outcrop at the river's edge opposite 160th Street almost directly in front of the site of old Fort Lee and just south of the boundary of the Palisades Park, being discovered there by three post-graduate students of Columbia University, Messrs. J. E. Hyde, D. D. Condit and A. C. Boyle, through whose courtesy and the good offices of Professor Kemp, the Museum has been enabled to acquire this specimen.

The red shales and sandstones in which this fossil was found belong to the Triassic period, the early part of the Age of Reptiles. The formation extends over a considerable part of New Jersey and is found also in the lower part of the Connecticut Valley and at other points along the Atlantic Coast, but fossils are everywhere rare and vertebrate fossils especially so. Great numbers of footprints indeed have been found in two or three locali-

ties, at Turners Falls on the Connecticut, near Boonton and elsewhere in New Jersey. But of the animals which made these footprints only two or three partial skeletons of small species have ever come to light.

This animal probably lived among the hills and valleys where now New York City stands. He was one of the lords of creation in his time — some ten million years ago, for the dinosaurs were the dominant land animals then and long after until the higher quadrupeds appeared. He was not indeed the “oldest inhabitant,” for many a race of animals had lived and died before his time, and no doubt they lived on what is now Manhattan Island as well as elsewhere, but he is the oldest whose mortal remains have actually been preserved to our day. Could he have arisen from his mausoleum in the rocks at Fort Lee, he might have supplied us with a rather startling volume of “Recollections of Early New York.” For in his time there were no Palisades, and from the eastern bank of what is now the Hudson River one might look across a broad estuary to the west and southwest, while the East River and Long Island, as far as we know, were not yet in existence.

### MUSEUM NEWS NOTES

SINCE our last issue the following persons have been elected to membership in the Museum:

*Patron*, MR. HENRY C. FRICK;

*Life Members*, MESSRS. LAZAR ANDERSON, GEORGE F. BAKER, JR., LYNFORD BIDDLE, W. LYMAN BIDDLE, J. INSLEY BLAIR, ANDREW CARNEGIE, RICHARD M. COLGATE, MARCELLUS HARTLEY DODGE, JOHN SHERMAN HOYT, RICHARD S. HUNGERFORD, WILLIAM ADAMS KISSAM, EDWARD DE P. LIVINGSTONE, GEORGE GRANT MASON, JOHN G. McCULLOUGH, MOSES CHARLES MIGEL, GEORGE B. POST, JR., HENRY H. ROGERS, SCHUYLER SCHEFFELIN, H. M. TILFORD, and HENRY WALTERS, MR. and MRS. PAUL M. WARBURG, DR. GEORGE T. HOWLAND and MMS. ANNE W. PENFIELD, FELIX M. WARBURG and WILLIAM SEWARD WEBB;

*Sustaining Members*, MESSRS. JAMES MARWICK and FREDERIC S. WELLS and MRS. BENJAMIN BREWSTER;

*Annual Members*, MESSRS. J. J. ALBRIGHT, A. CHESTER BEATTY, WILLIAM ADAMS BROWN, CHARLES DU PONT COUDERT, CHARLES CURIE, JR., BRYAN DAUGHERTY, MELVILLE EGGLESTON, WILLIAM FARNSWORTH, JOHN W. GARRETT, ROBERT GARRETT, RUSSELL HOPKINS, ARTHUR INGRAHAM, NORMAN JAMES, EMORY S. LYON, WILLIAM G. MATHER, PAUL MORTON, HENRY F. DU PONT, CORNELIUS VAN VORST POWERS, WILLIAM SPROULE,

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THE "AGE OF MAMMALS" by President Henry Fairfield Osborn has come from the press of the Macmillan Company and will receive notice in a later issue of the JOURNAL.

THERE has just been presented to the American Museum of Natural History and placed on exhibition in the Morgan-Tiffany Gem Room a specimen of the new gem Morganite (rose beryl). It is a long oval stone of rich rose color and weighs  $57\frac{1}{4}$  carats. This gem was named by Dr. George Frederick Kunz, the Honorary Curator of Gems of the American Museum, at a meeting of the New York Academy of Sciences on December 3, 1910.

DIRECTOR HERMON CAREY BUMPUS has recently been decorated by His Majesty, King Charles of Roumania, with the Grand Cross of the Commander of the Order of the Crown. This highest rank of the Order is bestowed upon Director Bumpus in recognition of his well-known services to science.

DR. A. D. GABAY of New York City has presented to the Museum a valuable collection of ground and polished shells from California and Japan. These specimens with their convolutions and superb nacre make objects of great beauty. They will be installed in certain sections of the Hall of Mollusca, illustrating the economic and ornamental uses of shells.

DURING the past month the Museum has received, as a gift from Mr. D. C. Staples, a small but very interesting collection of archaeological and ethnological material which comes from the Provinces of Esmeraldas and Manabi in the extreme northern part of Colombia, South America.

THE CHILD WELFARE EXHIBIT will be held during January in the Seventy-first Regiment Armory, New York City. At this exhibit the Museum will illustrate the work it is doing in coöperation with the public schools. It will show the loan collections sent to the schools, photographs and descriptions of the Children's Room at the Museum and of the Room for the Blind, drawings and models made by children in these rooms and

photographs of permanent exhibits especially interesting to children. As a part of the exhibit an automatic stereopticon will display pictures used in the pupils' lecture courses.

TWENTY-THREE cases of zoölogical material representing several hundred skins of birds and mammals have arrived in New York as the first shipment of specimens from the Stefánsson-Anderson Arctic Expedition.

### MEETINGS OF SOCIETIES.

Public meetings of the New York Academy of Sciences and its Affiliated Societies are held at the Museum according to the following schedule:

On Monday evenings, The New York Academy of Sciences:

First Mondays, Section of Geology and Mineralogy.

Second Mondays, Section of Biology.

Third Mondays, Section of Astronomy, Physics and Chemistry.

Fourth Mondays, Section of Anthropology and Psychology.

On Tuesday evenings, as announced:

The Linnaean Society of New York, The New York Entomological Society and the Torrey Botanical Club.

On Wednesday evenings, as announced:

The New York Mineralogical Club.

On Friday evenings, as announced:

The New York Microscopical Society.

The programmes of the meetings of the respective organizations are published in the weekly *Bulletin* of the New York Academy of Sciences and sent to the members of the several societies. Members of the Museum on making request of the Director will be provided with the *Bulletin* as issued.

**LECTURE ANNOUNCEMENTS****PEOPLE'S COURSE**

Given in coöperation with the City Department of Education.

Tuesday evenings at 8: 15 o'clock. Doors open at 7: 30.

The first five of a course of eight lectures on "New Movements in Old Asia."

January 3 — DR. ARTHUR JUDSON BROWN, "New World Conditions in the Far East — the Forces at Work."

January 10 — DR. ARTHUR JUDSON BROWN, "Imperial Japan." Illustrated.

January 17 — MR. EDWIN EMERSON, "The Russo-Japanese War." Illustrated.

January 24 — DR. ARTHUR JUDSON BROWN, "Independent Korea." Illustrated.

January 31 — DR. ARTHUR JUDSON BROWN, "The Struggles between Russia and Japan for the Leadership in the Far East."

Saturday evenings at 8: 15 o'clock. Doors open at 7: 30.

January 7 — DR. HERMANN M. BIGGS, "The Health of New York."

January 14 — DR. WILLIAM HALLOCH PARK, "Communicable Diseases — Their Prevention."

January 21 — DR. H. D. PEASE, "The Relation of Flies to the Transmission of Disease."

January 28 — DR. ERNST J. LEDERLE, "The City Milk Supply and Its Control."

**LEGAL HOLIDAY COURSE**

Fully illustrated. Open free to the public. Tickets not required.

Lectures begin at 3: 15 o'clock. Doors open at 2: 45.

January 2 — MR. ROY W. MINER, "Corals and Coral Islands."

February 22 — PROF. C-E. A. WINSLOW, "Insect Carriers of Disease."

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THE AMERICAN MUSEUM  
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THE AMERICAN MUSEUM OF NATURAL HISTORY was established in 1869 to promote the Natural Sciences and to diffuse a general knowledge of them among the people, and it is in cordial coöperation with all similar institutions throughout the world. The Museum authorities are dependent upon private subscriptions and the dues from members for procuring needed additions to the collections and for carrying on explorations in America and other parts of the world. The membership fees are,

Annual Members.....	\$ 10	Fellows.....	\$ 500
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THE MUSEUM LIBRARY contains more than 60,000 volumes with a good working collection of publications issued by scientific institutions and societies in this country and abroad. The library is open to the public for reference daily — Sundays and holidays excepted — from 9 A. M. to 5 P. M.

THE MUSEUM PUBLICATIONS are issued in six series: The American Museum Journal, Annual Report, Anthropological Papers, Bulletins, Guide Leaflets and Memoirs. Information concerning their sale may be obtained at the Museum Library.

GUIDES FOR STUDY OF EXHIBITS are provided on request by the Department of Public Education. Teachers wishing to bring classes should write or telephone the Department for an appointment, specifying the collection to be studied. Lectures to classes may also be arranged for. In all cases the best results are obtained with small groups of children.

WORKROOMS AND STORAGE COLLECTIONS may be visited by persons presenting membership tickets. The storage collections are open to all persons desiring to examine specimens for special study. Applications should be made at the information desk.

THE MITLA RESTAURANT in the east basement is reached by the elevator and is open from 12 to 5 on all days except Sundays. Afternoon Tea is served from 2 to 5. The Mitla Room is of unusual interest as an exhibition hall being an exact reproduction of temple ruins at Mitla, Mexico.

# The American Museum Journal

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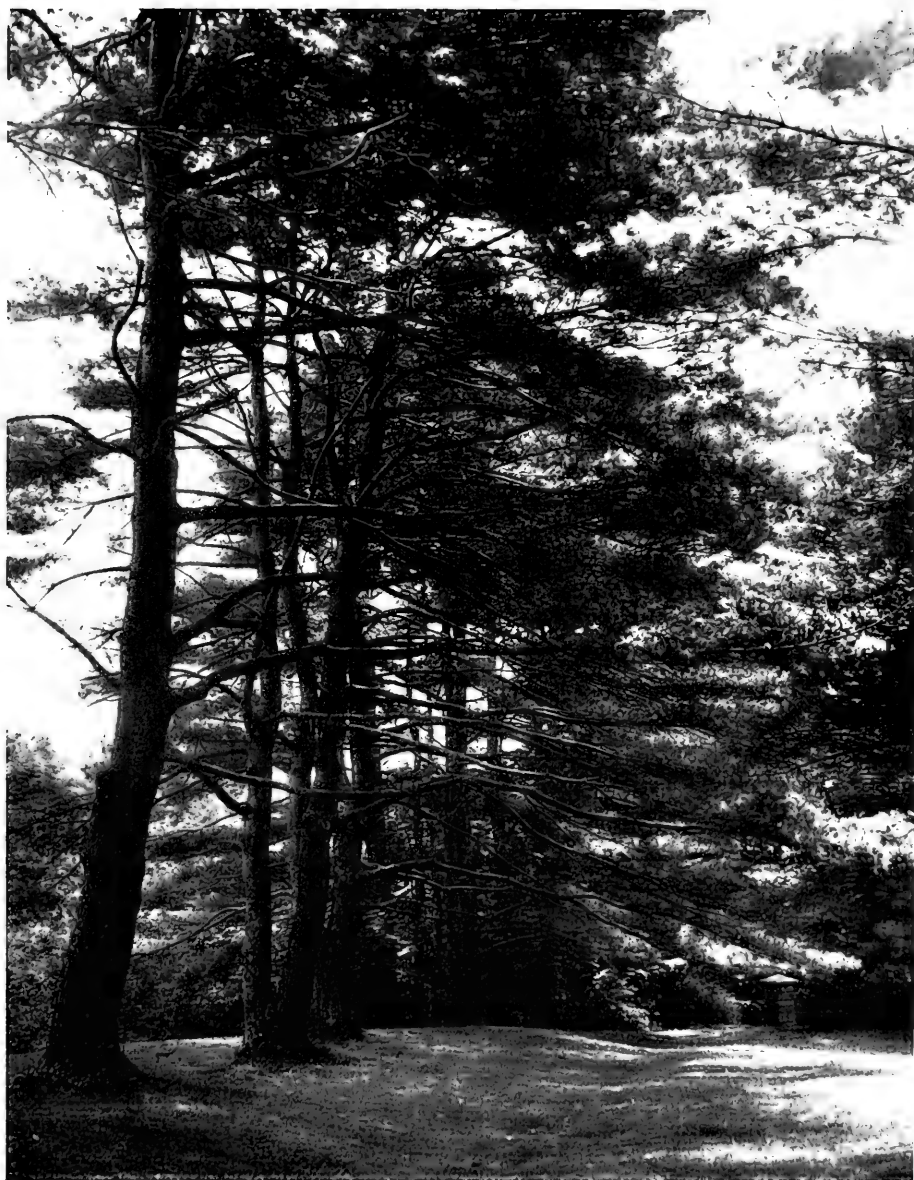
MARY CYNTHIA DICKERSON, *Editor*

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*From Trees and Forestry [In press,*

PINES ON THE ESTATE OF THE LATE MORRIS K. JESUP, LENOX, MASSACHUSETTS

# The American Museum Journal

VOL. XI

FEBRUARY, 1911

No. 2

## QUOTATIONS CONCERNING MORRIS KETCHUM JESUP AND THE AMERICAN MUSEUM<sup>1</sup>

WHEN Mr. Orr called upon Mr. Jesup to request his consent to his nomination as President of the Chamber of Commerce, he found him engrossed in the study of some building plans which covered his table. "Mr. Jesup," said Mr. Orr, "I have got a piece of interesting news to give you." "All right," said Mr. Jesup, "just wait a moment until I show you this plan." "But, my dear Jesup," remonstrated Mr. Orr, "this business of mine is important. I have come to tell you that I wish to nominate you for President of the Chamber of Commerce." "Indeed," said Mr. Jesup, "I am glad to hear it, but, look here, I want to show you what a splendid plan this is." And he turned back again to the papers on the table. It was only after he had relieved his mind of this paramount interest that he had leisure to appreciate the new honor and responsibility to which his colleagues of the Chamber invited him.

The plan which Mr. Orr found Mr. Jesup studying was that of the new wing of the American Museum of Natural History. The place which the Museum held in Mr. Jesup's regard, the long and devoted service which he rendered it, and the eminence which it attained under his leadership are well known. For more than a quarter of a century it was his controlling interest, and it remains to-day his most enduring monument.

"The two grandly distinctive features of Mr. Jesup's administration," writes President Osborn, "were, first, the desire to popularize science through the arrangement and exhibition of collections in such a simple and attractive manner as to render them intelligible to all visitors; and secondly, his recognition that at the foundation of popular science is pure science, and his determination, which increased with advancing years, that the Museum should be as famous for its scientific research and explorations as for its popular exhibitions of educational work."

<sup>1</sup> MORRIS KETCHUM JESUP: A CHARACTER SKETCH. By William Adams Brown. Charles Scribner's Sons, 1910.

On December 29, 1906, a large and representative audience gathered in the lecture room of the Museum to witness the presentation to the Trustees of the series of busts of eminent American naturalists which now adorns the spacious anteroom through which visitors approach the Museum. The idea was Mr. Jesup's, and he provided the funds. The gift fitly symbolizes his conception of the part played by science in the complex circle of interests, of whose joint efforts the Museum is the expression.

"I suppose," says Mr. Choate, his fellow founder and trustee, speaking some years later at the Chamber of Commerce, "that I may speak with authority of Mr. Jesup's services to the world in the Museum of Natural History. I should hardly venture in the presence of Mr. Morgan to claim for him a monopoly of the generosity that endowed that institution from the beginning; nor would I forget the abundant aid of many other generous benefactors; but I will say that he was the chief factor, the most powerful and effective agent in bringing it to the great eminence that it enjoys to-day."

This great service was fitly signalized by his fellow trustees on February 12, 1906, when in commemoration of the twenty-fifth anniversary of his presidency, they presented to him a loving cup beautifully designed in gold, with inscriptions and symbols in allusion to those branches of science in which he had taken a special interest. On one face of the cup reference was made to the forestry of North America; on another his interest in vertebrate paleontology was indicated, and his gift of the Cope collection of fishes, amphibians, and reptiles was mentioned; on the third face was a design symbolizing the work of the Jesup North Pacific expeditions, the last and greatest of the enterprises toward which his efforts were directed.

"It is not because of the long period of his service," writes Professor Bumpus, "nor because of his unflinching devotion, nor yet because of his innumerable gifts, that Mr. Jesup's administration of the affairs of the American Museum of Natural History will mark a distinct epoch in the history of the institution...."

"It is because he served long and also well; it is because he was devoted and at the same time exercised good judgment; it is because he not only gave but gave wisely, that he finally enjoyed the fruit of his labor, that his devotion to the Museum ripened into absorbing affection, and that his example of giving infected those associated with him."



From *Trees and Forestry* (In press)

FLOWERING DOGWOOD, JESUP COLLECTION OF WOODS

The models of leaves, flowers and fruits are so perfectly executed that it is often difficult to discover even by careful scrutiny how much is the original and how much is reproduced



From *Trees and Forestry* [In press]

BLACK WALNUT, JESUP COLLECTION OF WOODS

Full-grown black walnut trees practically no longer exist in America's forests. Thus the Jesup Collection is already beginning to prove its value as an historical record.



## FORESTRY AND THE MUSEUM

THE MUSEUM A POWER FOR THE EDUCATION OF THE PUBLIC REGARDING  
IMPORTANT QUESTIONS OF THE PERIOD

*By J. W. Toumey*

[ACTING DIRECTOR OF THE YALE FOREST SCHOOL AND MORRIS K. JESUP PROFESSOR OF SILVICULTURE, MEMBER OF THE APPOINTIVE COMMITTEE OF WOODS AND FORESTRY OF THE AMERICAN MUSEUM OF NATURAL HISTORY]

AT no period of our national life has the public been so keenly alive to the importance of our forests and what they mean to the future welfare of the nation. We have in comparatively recent years segregated more than 190,000,000 acres from our national domain and withdrawn it from settlement that it might remain forever the forest property of the nation. We are asking in the Weeks Bill<sup>1</sup> now before Congress that large areas in the Appalachian and White Mountains be purchased outright by the national government to form a part of the forest property of the nation. Many of the states, as is the case with New York and Pennsylvania, have already purchased large tracts of forest property and set them aside as forest preserves. The present outlook appears to indicate that many such reserves will be established in the states east of the Great Plains in the near future. As a nation we are demanding the conservation of our forest property and asking private owners of forest property to manage it in accordance with the ideas of scientific forestry. Although the public is fully in accord with the idea of national and state forests and fully realizes the need for a better utilization of our forest property, it is yet woefully ignorant regarding the forest as a living thing and has but little information

<sup>1</sup> The Weeks Bill is scheduled to come up for Senate vote on February 15, 1911. It is as follows:

"To enable any state to coöperate with any other state or states, or with the United States for the protection of the watersheds of navigable streams, and to appoint a commission for the acquisition of lands for the purpose of conserving the navigability of navigable rivers."

This bill, the product of the combined study of some of the ablest men in Congress, is a general conservation bill for the creation of national forests. The immediate interest, however, lies in the Appalachian and White Mountain region controlling the watersheds of the most important rivers of the East and the South and containing a great part of the timber supply.

The question of reserves for the East has been under discussion for ten years. The Weeks Bill itself has previously passed the Senate three times and the House once. In the sixty-first Congress it again passed the House, June 24, 1910; it was filibustered in the Senate, however, so that Congress adjourned without a passage of the bill.

From *Trees and Forestry* [In press].  
of the American Museum.

Department of Woods and Forestry



VIEW FROM MOUNT WILSON

From *Trees and Forestry* [In press]

In spring the melting snows of mountains are absorbed and held by surrounding forests as in a sponge, to be sent out slowly throughout the summer in an equalized supply of water to lower levels. If the forests are cut from the slopes, this water is wasted in damaging floods, while in summer there are droughts and rivers run low



A WHITE PINE ON THE ESTATE OF THE LATE MORRIS K. JESUP

This tree was a particular favorite and was saved in spite of the advice of landscape gardeners



From *Trees and Forestry* [In press]

[ DECORATIVE BIRCHES AGAINST A BACKGROUND OF DARK TREE TRUNKS. ESTATE OF THE LATE  
MORRIS K. JESUP, LENOX, MASSACHUSETTS

regarding the many ways the forest affects our present prosperity and how vital its conservation is to the future life of the nation.

The usefulness of a Museum depends upon how fully it serves the public as an educational institution, whether the instruction concerns the preservation of forests, of the country's mammals and birds, questions along lines of public health and public education or yet other directions of work. To a very large degree its power to instruct is measured by its effectiveness in commanding attention regarding the things worth while in everyday life. For this reason at one period of its history a museum may have to direct public attention to events and things quite different from at other times, depending upon the particular needs of the period. The old idea of a museum as a storehouse for miscellaneous objects from all corners of the earth is of the past. A new idea prevails, that a museum is to a large degree a place in which objects are exhibited in such a manner as to convey to the public the greatest amount of useful information of present interest.

The Forestry Hall of the American Museum at present and in its future development along lines following out Mr. Jesup's original interests and pioneer work in forest preservation<sup>1</sup> has a great work to do in education. The present interest in forest conservation and the need for public education regarding the life of the forest and the important uses that the forest serves in our national economy, clearly point out the direction that the future development of the American Museum must take in reference to this important subject.

† On December 6, 1883, Mr. Jesup presented in the Chamber of Commerce the following:

"TO THE HONORABLE THE LEGISLATURE OF THE STATE OF NEW YORK, IN SENATE AND ASSEMBLY CONVENED:

May it please your Honorable Body:

The Chamber of Commerce of the State of New York is alarmed at the dangers which threaten the water supply of the rivers in the northern part of the State through the destruction of the forests which protect their sources.

The Chamber believes that the preservation of these forests is necessary to maintain an abundant and constant flow of water in the Hudson, the Mohawk and other important streams; and that their destruction will seriously injure the internal commerce of the State. As long as this forest region remains in the possession of private individuals, its protection from fire and lumbering operations will be impossible. Believing, then, that this matter is one of very great importance, and that the necessity exists for immediate legislative action, we humbly pray your Honorable Body to adopt such measures as will enable the State to acquire the whole territory popularly known as the Adirondack Wilderness, and hold it forever as a forest preserve."

[That the proposed legislation was eventually secured and that New York has its state forests to-day was largely due to the unceasing efforts of Mr. Jesup.] Here, as so often, his work was that of a pioneer. To-day forest preservation has become an accepted national policy; but twenty-five years ago this was not the case, and the action taken by the Chamber of Commerce on Mr. Jesup's initiative was an important factor in educating the sentiment which has made the wider movement possible.

From *Morris Ketchum Jesup*, Charles Scribner's Sons, 1910.

## REPORT FROM THE CONGO EXPEDITION<sup>1</sup>

*By Herbert Lang*

[The Museum's Congo Expedition sends word of the health of its members and the success of its work in zoological survey, with the story of hunting the rare okapi from a chain of isolated camps in the hot, wet jungle. The next issue of the JOURNAL will contain a colored plate of the okapi with an account of present knowledge regarding the species.— Editor]

WE left Avakubi December 7, 1909, with fifty-five porters and after increasing our collections at N'Gayu and Bafwaboka, arrived at Medje January 13. As we heard about good hunting grounds, possibly with okapi, south of Gamangui, we made the necessary preparations and set out at once. After more than six months' work in a lonely uninhabited tract some eighty miles square, we returned to Medje July 17. Since then we have made several transports and stored safely all our collections, besides accumulating the necessary equipment with which to set out next Saturday, October 15, for the Uele.

We profit by this occasion to thank all those who have extended to us the privilege of carrying on such interesting work in regions that well deserve to be called the "Heart of Africa," and who by their great generosity have provided us with an equipment that makes it comparatively easy to maintain good health even under a most trying and disagreeable climate. Though camped for nearly six months in or about the dense forest, we both enjoyed excellent health.

All our native helpers have always been in good condition. All our equipment including firearms and tents is in perfect order. Our supplies are sufficient to carry on the work without interruption. The active personnel has remained practically the same — eighteen native assistants. One Loango had to be sent back to Leopoldville on account of the ill-health of his wife, and has since been replaced by an intelligent Mangbetu, whose services are very desirable in this region of the Mangbetu people.

The plans for portorage have worked very satisfactorily, and although the natives are true cannibals and are seldom seen without poisoned arrows or other weapons, we have succeeded well in enlisting their services. This may best be illustrated by the fact that the Congo Expedition since leaving Stanleyville has employed and paid more than 3,400 natives and has never experienced the slightest accident in handling them.

The record of the expedition shows a total of 4,952 specimens collected, exclusive of at least 15,000 invertebrates, and 1,120 pages of data and descriptive notes which are supplemented by 800 photographs. It is

<sup>1</sup> Selections from the *Annual Report of the Congo Expedition* by Herbert Lang. Manuscript sent from Medje, Haut Ituri, October 8, 1910; received at New York January 13, 1911.

probable that these are the largest and most important collections ever gathered by a single expedition in the midst of the dense forest of the Congo, and they represent a completeness of series that will be surprising. How true this is may be ascertained from the work with regard to the okapi, but all departments have equally profited.

All the skins have been safely stored away in the expedition's large galvanized iron tank originally brought in sections to Avakubi, where it has been put up in one of the government magazines. The remainder of our collections is stored in a government magazine in Medje, which we ourselves have lately made fireproof by constructing a ceiling of beams and sticks, covered with reeds and a layer of soil.

The record for large mammals is as follows: 402 specimens covering 50 species = a nearly complete series of the larger mammals of the dense Congo forest, 206 pages of descriptions, 76 skeletons, a large collection of foetal specimens, 18 plaster casts and many photographs.

For nearly six months we camped as close as possible to the haunts of the okapi and though we profited by the skill of the most experienced native trappers, who were engaged in catching okapi for food purposes, during the first two months we secured no reasonable success. The superstition of the natives, and the hot moist climate, counteracted our best organized efforts. After interminable palavers, however, the native trappers consented to allow our native assistants, who were trained to skin large mammals independently, to camp with them in the forest.

Therefore we established three camps at a distance of fifteen to twenty-five miles from our main camp, thus adopting the native system of hunting in small parties, for in these perfectly uninhabited forests it is an impossibility to provide suitable food for any large company of men. Whenever the native trappers succeeded in killing an okapi, some of them would march day and night toward our main camp. In the meantime our native assistants who camped with them would take off the skin and cure it as much as possible until I could reach the place. Within two months from the time of organization of this plan, we had added to the two skeletons of male and female already obtained, three perfect skins of females and that of a young okapi.

Two months later we at last succeeded in obtaining a good sized male. This okapi like all the others had been caught by a noose around the foot, but in an almost impenetrable swamp. Unfortunately in its struggles to free itself, it rubbed a portion of the skin, which however can easily be repaired.

The following month we secured the accessories for the group on the very same spot where one of the males had expired, which chanced to be



*Through courtesy of the British Museum*

HEAD OF MOUNTED OKAPI, BRITISH MUSEUM

Young male okapi presented by the late Mr. Boyd Alexander, 1907. Welle River near northern border of the Congo Free State. From *Monograph of the Okapi* by Sir E. Ray Lankester, 1910

one of the most typical portions of the haunt of the okapi. The accessories represent twenty-five loads of material. Of the larger trees the bark only has been taken, and everything has been so numbered that there will be no trouble in readjusting the different sections or pieces of bark. Many leaf moulds have been made. Mr. Chapin has prepared very exact and beautiful color sketches of the different leaves. Besides, typical twigs and leaves of all trees, bushes and low plants are preserved in formalin.

The casts of the heads of male and female okapi are deserving especial mention. The exterior of the head shows no giraffe-like characters which, judging from the skull, were supposed to exist. Indeed, the lips are not prehensile in any way and on account of the somewhat square mouth and rather small eyes there is much more resemblance to the head of a large deer. The prehensile tongue, the palate and sections of the four divisions of the stomach have been preserved in formalin. There is also the complete skeleton of a large-sized embryo showing a very interesting stage. The descriptions are rather complete with regard to habits, food, calving season and haunts. Detailed measurements have been secured. Over forty-five excellent photographs will guarantee correct representation of the group work. Detailed photographs of every form of vegetation have also been secured.



With regard to elephants, I sincerely hope that we shall succeed in preparing the skins of one or two large specimens. Permission to collect four specimens has been granted by *Son Excellence, le Vice-Gouverneur Général de la Colonie*, F. Fuchs, at Boma.

The Lado Enclave, with its white rhinoceroses, is now out of our reach, as on account of the demise of His Majesty, King Leopold, these regions have been returned to England. On the other hand according to some reports lately received, it is not impossible that we may find these interesting creatures in the eastern portions of the Uele.

Of small mammals there are 1,054 specimens collected. During several



*Through courtesy of the British Museum*

PHOTOGRAPH OF LIVING OKAPI ONE MONTH OLD

Photograph taken by Monsieur Ribotti on the Welle River. The photograph was shown at the meeting of the British Association at Leicester on August 5, 1907, and reproduced in *Illustrated London News*, September 7, 1907

months the expedition had from 300 to 500 traps set and daily revised. The Mangbetu have displayed remarkable skill in capturing the smaller mammals with their own native traps.

A collection of 1,885 birds covering 290 species is accompanied by full and exact data. Very many of the species are represented not only by both sexes, but also by a series of young in different plumages. A large number of nests and sets of eggs have been secured. The most interesting of the nests is that of the largest hornbill (*Ceratogymna*). It was the desire of Mr. Chapman to have a group showing the peculiar habit these birds have of enclosing the female by a plaster of mud. We were fortunate to secure remarkably fine accessories, also the male and female birds and the young. The nest was located at a distance of about 70 feet from the ground in a tree over 130 feet high. The tree was felled and a sufficiently long portion cut out and sawed into sections for transportation. Twenty color sketches of birds have been prepared, among which are the hornbills for the group.

For the Department of Anthropology an interesting collection of 700 specimens has been gathered from the Mangbetu, the most highly cultured natives of these regions. Full data giving necessary explanations with regard to use, habit, custom or belief have been entered in the catalogue. Besides, a great number of photographs show the many phases of daily life, such as village scenes, dances, social gatherings and ceremonials. Excellent portraits and plaster casts have been gained. Several of the remarkably elaborate hairdresses of both men and women have also been obtained in perfectly intact condition.

The Mangbetu excel in their iron work; indeed their well-forged and finely-worked knives are masterpieces of negro blacksmithing. Their pottery in its best samples reminds one of ancient Greek work. In producing well-balanced forms of artistic finish they show a very high development. Their carved and ornamented stools, benches, figures and shields, and their hat-pins of ivory may well be classed among works of art.

A Pygmy child's skeleton is obtained, and shows a very interesting lengthening of the skull, produced by the common habit among the Mangbetu (adopted by the Pygmies who are attached to their villages) of using bandages about the new-born child's head. Photographs showing this practice have been taken.

I take pleasure in repeating from the report of November 29, 1909, the statement that the coöperation of the Belgian Government is most cordial, and that all the officers have assisted us according to their position or our needs.

## THE FINISHED FUR SEAL GROUP

WITH REMARKS ON THE HABITS OF THE FUR SEAL AND THE PRESENT CONDITION OF THE SEALING INDUSTRY

*By Charles H. Townsend*

THE fur seal group, mounted by Mr. Blaschke and recently put on exhibition in the Hall of Mammals, is the gift of the late Mr. D. O. Mills. The Museum has long been in need of just such a series of fur seals, which includes the adult male, females and young.

The fur seal holds a unique place in the annals of international controversy. No other wild animal has ever been the subject of a dispute so earnestly contested and so long continued. For more than twenty years the American and Asiatic seal herds have been under almost constant discussion, and the reading public on two continents at least has become familiar with the subject under such headings as the "Bering Sea Controversy," the "Fur Seal Question," or the "Pelagic Sealing Matter."

The fur seal industry has been investigated and reported upon at different times by international commissions and two courts of arbitration have solemnly considered it in every possible phase. The report of the Paris Tribunal alone consists of eighteen thick octavo volumes, while the documents of the United States Senate and House of Representatives, State Treasury and Commerce departments, devoted exclusively to the fur seal subject, are too numerous to mention. For several years during the height of the controversy the warships of Great Britain and the United States patrolled the waters of Bering Sea watching every move of the sealing fleets, and a number of revenue cutters has remained on guard even to the present time. Although the sealing regulations framed by the Paris Tribunal in 1892 remain in force, the fate of the fur seal as the basis of a valuable industry is still unsettled. Its continued existence as a species becomes more doubtful every year and renewed efforts are being made to save it.

The cause of the trouble is simply the value of the fur seal's pelt. Here is the story in a nutshell. Before the great ocean sealing fleets came into existence, the catch of seal skins was made on the islands in Bering Sea where the animals breed. Only selected males were taken and these were killed under careful government supervision. As the fur seal is highly polygamous there is always a natural surplus of males available for commercial purposes. With the development of ocean or "pelagic" sealing, the



PORTION OF FINISHED FUR SEAL GROUP

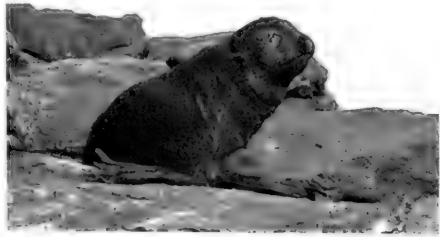
The seals, collected expressly for the Museum in 1908 at the Pribilof Islands, were the gift of the late Mr. D. O. Mills. The specimens were mounted by Frederick Blaschke, animal sculptor, to show a small portion of a seal rookery. (The young seals, which are on the other side of the group, are not in view)

killing of female seals began, and this naturally resulted in the rapid reduction of the breeding stock. Twenty-five years ago, with perhaps 4,000,000 seals in sight, it was possible to kill annually 100,000 male seals on the Pribilof Islands without injury to the herd. To-day with a herd of less than 175,000 seals remaining, the island catch of males is seldom more than 10,000.

The annual ocean sealing catch consisting chiefly of females has, in the meantime, dwindled from an average of 80,000 a year to a paltry 10,000; while the sealing fleet, which once numbered 120 vessels, now consists of fewer than thirty vessels.

The condition of the Asiatic seal herd is much worse, for both the land and sea catch have decreased to less than one-third of that derived from the American herd. The restoration of both herds to their former abundance and commercial importance can be brought about only by the complete suppression of ocean sealing.

As a result of the long continued investigations of the sealing industry, the natural history of the fur seal has been worked out perhaps more thoroughly and critically than that of any other mammal. Science has profited if the sealing industry has not, and many important discoveries have been made respecting the anatomy, food, age, breeding habits and migrations of this important animal.



A baby fur seal of the new group

Among the problems solved, we may consider briefly some of those connected with the wonderful migrations of the fur seal. Late in the fall the seals leave their island homes in Bering Sea and enter the Pacific Ocean. The American herd migrates southeastward to southern California, a distance of over three thousand miles, whence it moves northward along the coast during the winter, to enter Bering Sea the next summer. The Asiatic herd migrates southwestward to the coast of Japan, returning the following season by the same route. There is no commingling of the two herds either in Bering Sea or in the Pacific. Both herds remain afloat the entire winter, and neither herd is known to touch dry land anywhere except upon return to its native islands in Bering Sea. No other mammal follows with strict regularity so extensive a migration route.

## ZOOLOGICAL EXPLORATION IN SOUTH AMERICA

*By Frank M. Chapman*

THE report comes of the safe arrival of Mr. W. B. Richardson, who sailed from New York October 17 to collect birds and mammals for the Museum in the Cauca Valley of southern Colombia. He writes with enthusiasm of the opportunities offered in this part of South America which has been little explored. Mr. Richardson began work on the western slope of the coast range of the Andes. This has the reputation of being one of the most unhealthy portions of South America and for this reason, in connection with the fact that the region is uninhabited and is covered with heavy forest growth, it has heretofore been unworked by collectors. Advices from Buenaventura, the port of this part of Colombia, state that Mr. Richardson's first shipment was made on December 31. In this connection it may be added that while waiting the departure of the steamer from Panama for Buenaventura, Mr. Richardson made a collection of one hundred and thirty birds and mammals and his second shipment, therefore, was started before he had been absent from the Museum for three months. The American Museum is to be congratulated on having an active collector in this exceptionally promising part of South America and it is greatly to be hoped that work can be prosecuted so thoroughly that the institution will receive material to form a basis for a study of the distribution of life in this part of South America.

The American Museum is not the only American institution represented in South America which, as a matter of fact, is at present claiming greater attention from American zoölogists than at any previous time. Among the American expeditions now in South America are the following:

*First*, that of the U. S. National Museum which has recently initiated a biological survey of the Panama Canal zone.

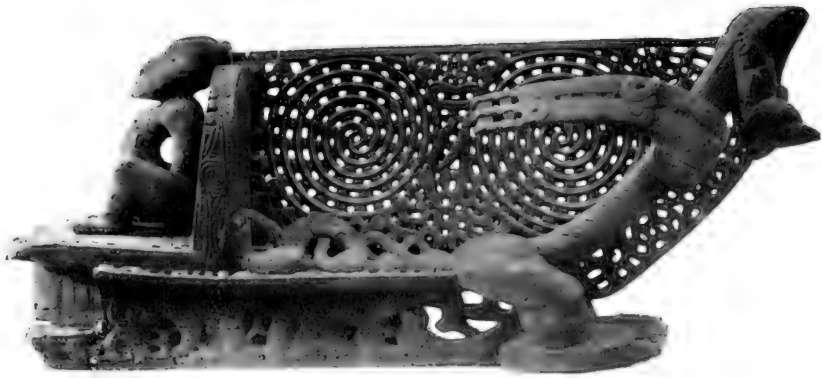
*Second*, an expedition under the charge of Mr. Wilfred H. Osgood, of the Field Museum, which sailed from New York on December 31, 1910, for Maracaibo in northwestern Venezuela.

*Third*, an expedition of the Carnegie Museum of Pittsburgh, under the charge of Mr. M. A. Carriker, who is now at work in northern Venezuela.

*Fourth*, an expedition from the Academy of Sciences in Philadelphia under the charge of Mr. Stewardson Brown, who sailed from New York on December 26, 1910, for Trinidad.

*Fifth*, an expedition under the charge of Mr. S. N. Rhoads, who is affiliated with the Academy of Sciences, Philadelphia, which plans to sail from New York on December 21, 1911, for Ecuador.

It is obvious, therefore, that so far as American zoölogists are concerned, the twentieth century is South America's, and it is very greatly to be hoped that the American Museum may take a leading part in the zoölogical exploration of this still little-known continent.



MAORI CARVED CANOE PROW

## THE NEW SOUTH SEA EXHIBIT

*By Robert H. Lowie*

### NOTES ON THE SOUTH SEA HALL

WITH the exception of a small Australian exhibit, the South Sea Hall opened to the public on January 25 is devoted entirely to the Museum's collection from Polynesia and Melanesia. Compared with the primitive folk of other regions of the globe, these South Sea Islanders are a seafaring race. In striking contrast to the African negroes, who generally manifest a strange repugnance to traveling by water, their voyages are reckoned not by hundreds but by thousands of miles. The most common craft employed in the area is a dugout canoe with an outrigger attachment. The Museum exhibit comprises a number of models of the simple canoes found in Samoa, Fiji and the Society Islands, while a larger model of a New Zealand boat illustrates the elaborate carving sometimes lavished on their structure. The tremendous distances actually traveled by the South Sea Islanders from their probable home in southeastern Asia to Hawaii and Easter Island have stimulated some scholars to account for certain similarities between South Sea Island culture and South American culture by the hypothesis that the Polynesians at one time touched the shores of the New World and succeeded in leaving their impress on the industrial life of its inhabitants. This theory, although defended by distinguished ethnologists, has been generally rejected, not because the South Sea Islanders are considered incapable of traversing the space of twenty-five hundred miles intervening between Easter Island and South America, but simply because the alleged cultural resemblances are far too few to be convincing and are readily explained by the assumption of independent development.

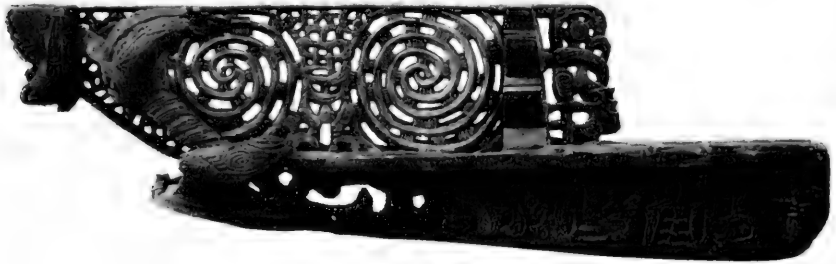


THE STATUE OF THE MAORI WARRIOR ON THE "LARGEST BLOCK OF JADE IN ANY MUSEUM  
IN THE WORLD"

The statue was made by Sigurd Neandross from direct studies of a living member of the Maori tribe. The block of jade which weighs three tons and came from South Island, New Zealand, was presented to the Museum by Mr. J. Pierpont Morgan, having been secured for him by George F. Kunz.



To the general public the exhibit in the new hall will be of interest, as showing the degree of culture which could be attained by people who at the time of their discovery were wholly ignorant of any form of metal work. Stone or shell adzes took the place of iron tools, and even the huge beams and rafters of some of the native habitations were held in position not by nails but by a cordage known as "sinnet" made from cocoanut fibre. Yet with the crude appliances at their disposal the Maori were able to construct large and richly decorated buildings, of which a fair idea is given by the model in the tower off the main hall, and they had skill to carve the beautiful canoe prows which excited the admiration of early travelers. The Cook Islanders produced the ceremonial adzes and paddles exhibited in two upright cases of the Polynesian section of the Hall; and the Melanésians of New Ireland executed their sacred carvings which while not beautiful according to our standards display a high degree of technical skill.



#### THE STATUE OF THE MAORI WARRIOR

DURING the past winter a troupe of Maori, the native people of New Zealand, performed some of their old-time dances in the Hippodrome and it was possible to have them pay several visits to the Museum, on which occasions they were photographed in various positions. It seemed highly desirable to secure life-size representations of members of the company in characteristic attitudes and after some preliminary discussion the chief Kiwi and one of the younger men, Hautuoterangi, consented to be cast. The pose suggested to the latter was that of an ancient warrior in an attitude of defiance, with tongue protruding and one leg above the ground. Thus originated the figure of the Maori warrior at the entrance to the tower of the new South Sea Hall.

Hautuoterangi felt highly honored to be the representative of his race, so that his descendants might see the statue when they visited the great city at any future time. His family pride was evinced in a desire that his family register for many generations back be engraved upon the jade.

The following from Robley's *Moko; or Maori Tattooing* suggests the requirements of the war dance pose: "The war dance. . . involved constant thrusting out of the tongue and so much distortion of the features that the blue lines of the Moko formed a quivering network. The time or cadence of the dance was marked by striking the palm of the left hand against the thigh."

As the work progressed, members of the Maori troupe called at the Museum and expressed satisfaction with the statue as a faithful record of native life. Their advice was especially serviceable on the subject of tattooing, for the Government has for some time prohibited the tattooing of Maori men so that for this phase of the work Mr. Neandross would otherwise have been obliged to rely wholly upon second-hand information, which he was thus enabled to check by the oral communications of native authorities. Thus the figure of Hautuoterangi, together with the Robley Collection of tattooed heads exhibited in the tower itself, conveys a very fair idea of probably the most distinctive form of personal decoration of the South Sea Islanders.

[The figure of the "Maori Warrior" is especially interesting to those who have followed the history of its making. The finished statue is the embodiment of a plan held by the Director of the Museum to whom the largest block of jade in the world suggested the need of some heroic theme to set forth the relation of this stone to the Maori people, who considered jade one of the most desirable articles of their wealth.

A year or more before the block of jade was brought into the hall where it now has position, Mr. Neandross had made sketches for a Maori figure to be placed upon the stone. Impetus was given to the work by the arrival of the Hippodrome Maori troupe in November of 1909, the friendly interest of these people in the Museum's project being gained through Professor H. E. Crampton.

It chanced that when Professor Crampton took the steamer at San Francisco for his latest journey to the South Seas, in the summer of 1909, he met a representative of the Hippodrome management who was on his way to New Zealand to bring back a band of Maoris. Some weeks after Professor Crampton's arrival at Tahiti, this man, with Mr. Whyte, the representative of the New Zealand Government, and thirty Maoris, came there from Auckland, in order to take the steamer to San Francisco; thus Professor Crampton met the entire crowd at that time. Later he went to New Zealand himself, and while visiting the volcano and geyser districts in the interior, spent some time at the very village from which these people had come, where he met their families and saw many of their native dances and heard their songs. On returning to New York, therefore, he was interested not only to see these people and tell them some of the later news from their own country and hear the same songs that he had heard ten thousand miles away in New Zealand, but also to bring the whole matter to the attention of the Department of Anthropology, which arranged for the visits of the Maoris, so fortunate in results for the Museum.

The statue represents some of the best work in the Museum done by Sigurd Neandross. It has the stamp of accuracy, being cast directly from a Maori native and the coloring studied from the same individual. The pose was a very difficult one to get in a cast, for in such tense action the muscles of a model tire and relax. Success was gained by making the mold in parts, and of course the open mouth and tongue and the tattooing had to be modeled.—Editor]

## NEW ZEALAND JADE

*By George F. Kunz*

THE largest specimen of jade known in any museum in the world is that in the American Museum. It was found in 1902 and weighs three tons, measures seven feet long and four feet wide and, in fact, is the largest mass of jade, of which we have record, that has ever been brought to civilized lands from anywhere. One of the greatest previously known is that in the British Museum and the second largest known piece<sup>1</sup> was found by the author in 1899 at Jordansmühl, Silesia. This piece second in size is now on deposit at the American Museum.

In New Zealand, jade is looked upon as a lucky stone and the common saying is that no one should leave New Zealand without taking away as a luck piece a bit of "green-stone." The earliest voyagers found that the Maoris of New Zealand wore ornaments made of stone of two varieties, the more important and valuable of which was a variety of jade known as nephrite. Among the ornaments were charms carved into the shape of flat, grotesque, seated figures, known as hei-tikis. The head of the figure was always tilted over to one side and much exaggerated, with the eyes exceedingly large and generally rendered very bright by an inlay of broad circles of a red, shellac-like wax, often holding in place broad, hollow circles of green abalone shell, the jade centres which protruded through the shell figuring the pupils of the eyes. From this New Zealand jade were also made certain Maori axe-shaped implements, drilled at the upper end, borne by the chiefs as badges of office. The one aloft in the right hand of the "Maori warrior" has a sharp cutting edge and measures fifteen inches in length. While these objects were ceremonial axes, they were probably employed on occasion as death-dealing weapons.

New Zealand jade has been found in largest quantities on the west coast of South Island at Milford Sound, in boulders associated with, and presumably found in, a rock-matrix of chlorite schist. The boulders appear in the mountain streams and usually range in weight from a few ounces to fifty or sixty pounds. This jade is generally green; on the outer surface of boulders it has often altered to a brown or yellow-brown sub-translucent material. The interior, however, is more or less translucent and occasionally of the richest green color as if covered with oil. In composition it is a silicate of lime and magnesia. It is a trifle less hard than quartz, but from its matted, felt-like structure is of extreme toughness, thus requiring

<sup>1</sup> Described in the Catalogue of Heber R. Bishop Collection, 2 vols., 430 pp.

much more manipulation to shape or polish than does quartz or agate. It has been extensively used in the arts in jewelry during the past six or eight years.

Much New Zealand jade has been worked into Chinese art objects, but the greater part of the material used in China, whether green or white, came from the Kuen-lun Mountains, Turkestan, south of Khotan. No white jade has ever been discovered in New Zealand, and no jade has ever been discovered in China proper, although all the worked articles from that empire are referred to as "Chinese jade." For the Chinese, jade symbolized all that was high and pure. Kwan Chung, in the seventh century before Christ, wrote that its smoothness symbolized benevolence; its brilliant lustre, knowledge; its toughness, justice; its rarity, purity of soul. That the smallest crack on its surface was immediately visible typified candor and the fact that although passing from hand to hand it was never soiled made it a symbol of a life governed by high moral principles.

Superstitious ideas largely contribute to the popularity of jade in China. Some thirty years ago a Russian officer saw on one of the roads in Turkestan a block of jade that had evidently been abandoned in the course of transportation. He was told that while it was on its way from the quarry of Raskem-Darya to Peking an order came to leave it on the road, for the heir apparent to the Chinese throne had just been attacked by a serious disease after having slept on a couch made of Raskem jade.

The nephritic variety of jade is often called the true jade and must not be confounded with jadeite, a distinct mineral which is a trifle harder, has a higher specific gravity, and is besides a silicate of alumina and soda. This latter material was that found in ancient Mexico worked up by the natives into various ornaments, of which the American Museum contains a fine series.

The exact place of occurrence of the Mexican jewel jadeite has never been discovered. In our own time jadeite is found only near the village of Tamaw, five days journey from Mogung in Upper Burma, near the Chinese boundary. It is of a white to green color or else white with green splashes of color often of rich and magnificent tints, and as much as \$15,000 has been paid for a thumb-ring of the choicest of this material. Neither nephrite nor jadeite has been found within the limits of the United States except in Alaska where true jade-nephrite has been discovered in Jade Mountain by Lieutenant Stoners, U. S. N. In this territory many fine jade implements have also been found and excellent representations of these are in the Museum collection.

## A TREASURE OF ANCIENT CHINESE BRONZES

*By E. C. B. Fassett*

IN 1901, Mr. Jacob H. Schiff donated funds to the American Museum for making investigations and collections in China, the administration of these funds being entrusted to a committee organized under the auspices of the Museum with the late Morris K. Jesup as chairman.

The work was placed in the hands of Dr. Berthold Laufer, who had just completed work as a member of the Jesup North Pacific Expedition to Eastern Siberia. Dr. Laufer spent the three years from 1901 to 1904 in China and the collection thus obtained is now in the Museum's Chinese Hall in the west wing of the building, while a letter recently received from Dr. Laufer, calls attention to its greatly increased value. He says in fact that after a diligent search in China he has been unable to make another collection of equal importance. His studies of this collection of bronzes appeared in 1909 in a report of the East Asiatic Committee of the Jacob H. Schiff Chinese Expedition.<sup>1</sup> This was published in Leyden because of the facilities there afforded in the way of Chinese type.

Among the specimens in the Chinese Hall there are two absolutely unique collections, the ancient Chinese bronzes and certain mortuary pottery of the Han period. Because of their relation to each other and to modern art, they have much the same interpretative value to East Asiatic study that the pre-Homeric or Minoan collections have to Greek art.

The history of China has charm because of its antiquity, its unparalleled continuity and the survival of its culture.



THE OLDEST AMONG THE MUSEUM'S  
CHINESE BRONZES

Bronze libation cup used in ancestor worship Shang Dynasty (1766-1122 B. C.). This bronze vessel must have taken its rise long before historical times, since allusions to it in Confucius are referred to the times of legendary emperors

<sup>1</sup> CHINESE POTTERY OF THE HAN DYNASTY. By Berthold Laufer. Published by E. J. Brill, Leyden, 1909. Report of the East Asiatic Committee of the Jacob H. Schiff Chinese Expedition.



ANTIQUE BRONZE MIRROR DECORATED IN CONCENTRIC RINGS (DIAMETER 8 IN.)

The first or inner ring holds the mystic trigram, the "pa-qua," accredited to the first of the legendary emperors (2852-2738 B. C.). This series of lines is of symbolic meaning embodying the oldest system of Chinese mystic philosophy. The second ring shows the "twelve ancient animals"; the outer, a very decorative inscription of twenty Chinese characters



BRONZE FU, CHOU DYNASTY

A sacrificial vessel for holding offerings of boiled grain in state worship

Following the mythological period (2852 B. C. to 2205 B. C.) came the period of the "Three Ancient Dynasties," the Hsia (2205 to 1766 B. C.), the Shang (1766 to 1122 B. C.) and the Chou (1122 to 255 B. C.), during which the purely native culture and institutions of China took form with-



A BRONZE SACRIFICIAL WINE JAR OF QUADRANGULAR FORM. (HEIGHT 10 IN.)

This wine jar is one-half tin in an alloy of copper according to the formula from the Chou dynasty (1122-255 B. C.) and bears a remarkable inscription proving it to have been made in the "Shang fang," the court atelier of the Han in the year A. D. 12.

"The shapes of sacrificial vessels. . . have in the course of imitation become the models in the later Jade and Ceramic industries. They have thus exercised no little influence on European pottery, the forms of which are, in their origin, not confined to the models handed down by Greece and Rome." Hirth



BRONZE "HILL-CENSER" (7 IN. HIGH)  
First type of Chinese censer made. Han  
dynasty

out foreign influence. Ancestor worship, always the leading feature of all religious belief among the Chinese, developed its highly elaborated ceremonials during these dynasties. The ritual of the sacrificial service increased in minuteness of detail and affected public and private life before the Chou or last of the Ancient Dynasties, when it reached its highest development; while the bronze bells and sacrificial vessels of manifold forms, each devoted to especial purposes and decorated with a great variety of symbolic ornament, bear witness to the culture and creative tendency of the Shang or middle period.

Following the Three Ancient Dynasties came the time of the Emperor Shi-huang-ti (255 to 206 B. C.) who built the great Chinese wall. Under the cruel law of this emperor antiquities had to be concealed lest they be destroyed. But after this the Han period (206 B. C. to 25 A. D.) proved a very productive time marked by external influences combined with much native originality. And still much later than the Han period, during the late Sung period (960 to 1126 A. D.) there was a great art renaissance, when bronzes hidden in ancient times were discovered and studied from a critical point of view.

It should be recalled that the art of bronze casting had reached perfection at the earliest period of the Ancient Dynasties. The Emperor Yü (2205 to 2198 B. C.) is said to have cast the "Nine Tripods" from bronze contributed from the nine provinces, upon which maps and records of the nine divisions of his empire were engraved. These tripods passed from dynasty to dynasty as emblems of the imperial power for over two thousand years.

The period of the manufacture of the bronzes in the Museum extends from the eighteenth century before Christ to the seventeenth century after. The collection therefore allows the unusual privilege of comparing original examples of the early Shang and Chou periods and of the somewhat less early Han period with those of the later Sung and Ming periods. This comparison proves the forms similar in the ancient and later work, but shows changes in detail, ornament and utility. Among the oldest pieces



are types of the bronze vessels used in the rites of ancestor worship, the form and detail of which were prescribed by the ritual of the ancient national religion. The demands of this religious cult created an epoch of artistic vases and other well-proportioned forms defined according to the nature of the offerings whether of wine, water, meat, grain or fruit.

Vessels for carrying wine were of vase forms. The quadrangular smooth wine jar in the illustration bears this interesting inscription, "Made in the Shang fang (court atelier of the Han) in the year A. D. 12." This type occurs as early as the Chou dynasty. The *tou*, a sacrificial vessel for offerings of meat, was shaped like a goblet, a vessel of common utility which seems to have existed in the Hsia dynasty (2205 to 1766 B. C.). Our example is a bronze *tou* of the late Ming time, illustrating the bowl with the stem, the base of which is bell-shaped; the cover of this bronze has been lost. It is a good imitation of the ancient Chou type (1122 to 255 B. C.). The *fu*, a rectangular vessel evolved from a basket, was used for holding grain or fruits in state worship.

The large bronze temple bell dates from the Chou period. It has peg-like ornaments, the utility or symbolism of which is not entirely understood. Similar peg-like forms appear on the backs of the bronze mirrors.<sup>1</sup> There are many examples of metallic mirrors in the collection, none of which are earlier than the Han dynasty, though literary references indicate the



BRONZE TON

A vessel of the ancient Chou type for offering cooked meat to the spirits of ancestors (The cover is lost)

<sup>1</sup> CHINESE METAL MIRRORS, with Notes on Some Ancient Specimens of the Musée Guimet. By Friedrich Hirth.

existence and use of mirrors from an earlier period. The one pictured is decorated with relief ornaments in concentric rings. The outer ring bears ideographs; the second ring presents the favorite and much discussed motive



BRONZE TEMPLE BELL, CHOU DYNASTY (1122-255 B. C.) (HEIGHT  $1\frac{1}{2}$  FT.)

Meaning of knob ornament not thoroughly understood; similar ornaments occur on Chinese metal mirrors

"The oldest extant witnesses of the antiquity of Chinese culture are the sacrificial vessels and bells of the Shang and Chou Dynasties"

"the twelve animals"; the inner ring holds the mystic trigram or "pa-quā" attributed to Fu-hi, the first of the three ancient sovereigns, and the center is marked by a tortoise-shaped perforated knob through which the cord handle passes.

Perhaps the hill-censers are the most unique example of the Han period. The Chinese name for these translates "brazier or stove of the vast mountain" from the fact that the cover has the shape of a hill emerging from waves. Openings in the cover permitted the escape of the incense. This mountain design is symbolic of the thought of the period and probably refers to the "isles of the blest," the abode of the immortals. This hill-censer of the Han period was the first type of censer made, the ancients not burning incense and so having no incense stoves. The favorite form of censers now found in Buddhistic, Taoistic and Confucian temples is from a bronze caldron originally devoted only to meat offerings. Censers made in the Ming period are numerous and of great beauty and the forms of all Chinese ritual vessels appear not only in bronze, but also in pottery, jade, glass and porcelain. To-day the early history of Chinese porcelains is still unwritten but the student will find in the Museum's Chinese Hall many early period examples of bronze and pottery which inspired the forms of the finest porcelains.

Dr. Laufer says: "The fact of a type of vessel sanctified for millenniums within the strict boundaries of rigid religious observances suddenly changing its object under outside currents of influence, but still retaining the shape, is of paramount ethnological value since it proves a higher degree of tenacity of forms and greater changeability of the ideas embodied in them: the forms survive while the ideas vanish or alter."

## "THE AGE OF MAMMALS"

*By William K. Gregory*

THOSE whose interests are wholly limited to every-day affairs will doubtless not find time for more than a hasty glance at the very numerous maps, diagrams and pictures in Professor Osborn's recently published book, "The Age of Mammals."<sup>1</sup> But those who possess in some measure the "scientific imagination" will find here a new world and a new point of view, from which Man may be seen in his proper historical setting.

<sup>1</sup>THE AGE OF MAMMALS in Europe, Asia and North America. By Henry Fairfield Osborn. Svo., pp. XVII + 635, figs. 220. The Macmillan Company, 1910.

Such readers will naturally be impressed with the enormous lapse of time required for the historical progression outlined in this book, especially when they consider the various estimates, ranging from three to six millions of years, which have been assigned by different investigators as the time equivalent of the Tertiary period. Nevertheless this period covers only the later chapters in mammalian history. For the class of which man is now the dominant member was already represented by certain little-known forms in the Triassic, at a time when the dinosaurs had not yet attained their preëminence and long before the Rocky Mountains were uplifted.

The diagram here reproduced summarizes the historical succession of the Tertiary and Quaternary formations in western North America, giving the maximum thickness of each and distinguishing the deposits of the Great Plains from those of the Rocky Mountains. The "zones" are time periods, named from mammalian genera that are especially characteristic of the corresponding formations, while on the extreme right are the names of some of the other mammals that serve as time markers in the "chronometer of evolution."

This diagram epitomizes a part of the results of Professor Osborn's studies on the "correlation of Tertiary mammal horizons in Europe, Asia and North America," a problem which has been slowly worked out with the aid of many colleagues in this country and abroad. From these data he draws some very far-reaching conclusions on the origin and spreading of faunas from continent to continent, and on the appearance and removal of geographical barriers to faunal interchange. Such conclusions invest the dry facts of geographic and geologic distribution with a larger and more fruitful meaning.

Regarding the evolution of mammals, the introduction deals very clearly with the rise of paleontology and with the laws of evolution of the teeth, feet and skull. The "irreversibility of evolution" and the causes of the extinction of mammalian species are among the many topics of general biological interest.

Very gratifying is the fact that this Museum has been able to furnish a large part of the material for a work of such far-reaching importance to the student of mammalian evolution. Many of the mounted skeletons in the Hall of Fossil Mammals appear here, accompanied by excellent restorations from the gifted brush of Charles R. Knight. The numerous and thorough Museum expeditions in the West and elsewhere, which have been carried on systematically during the past twenty years, furnish scores of field pictures, maps and geological sections. The manifold systematic, faunal and stratigraphic studies by Professor Osborn, Dr. Matthew and others, have thus been joined synthetically with the results of paleontologists and geologists the world over.





The Senckenberg Museum of Natural History opened its new building to the public in October, 1907, at which time, as to-day, the place of honor in the court of the central structure was given to the great fossil skeleton of the Diplodocus, the only original Diplodocus in Europe, that is composed of bone and not of plaster. This gift of the late Morris K. Jesup was made in the hope that it might prove instrumental in binding more closely together not only the New York and Frankfurt Museums but also the American and German peoples. It will be remembered that recognition of the gift was made by the conferring of honors upon

the late President Jesup and upon Director Bumpus, the latter having gone to Frankfurt to be present at the dedication of the building. It is especially gratifying that the Senckenberg Museum has sent this historic fossil as proof of continued good will

## HISTORIC FOSSIL FROM SENCKENBERG MUSEUM

THE valuable fossil described in the accompanying letter has been accepted for the American Museum by President Osborn with expressions of appreciation of the gift not only as such but also as an "index of the peculiarly cordial relations which prevail between the Senckenberg Museum and the American Museum and of the spirit of broad scientific interest which animates both."

SENCKENBERG NATURAL HISTORY SOCIETY  
FRANKFURT-AM-MAIN December 6, 1901.

HONORED COLLEAGUE:

The Senckenberg Natural History Society has wished for a long time to dedicate a gift to the American Museum in token of especial high regard. Since our Museum has recently received the best specimen yet found of *Mystrasaurus bollensis* Cuvier we are able to release our older specimen, likewise very fine, a photograph of which I enclose. In their meeting of December 7 the administration of our society concluded therefore to present this specimen to the American Museum of Natural History.

In the meantime our trustee, Dr. Lotichius, has informed us that your Museum would be disposed to arrange an exchange of our *Mystrasaurus* for a skeleton of the American short-legged rhinoceros. Although I do not deny that the Senckenberg Museum would welcome with great pleasure the possession of a good skeleton of *Teloecceras*, we beg that in consideration of the decision previously reached by us, you will feel free to receive the *Mystrasaurus* as a gift and we hope for its friendly acceptance.

I add the following data in regard to the specimen. The *Mystrasaurus* was obtained at Holzmaden in Württemberg in the Posidonia zone of the Liassic. It was described by H. G. Bronn (Abhandlungen über die gabelartige Reptilien der Liasformationen, Stuttgart 1841) who stated it to be the largest and most complete of the German skeletons. Andreas Wagner (Abhandlungen Kgl. Bayer. Akademie Wissenschaften Bd. II p. 545 ff, 1850) considered the species identical with *Mystrasaurus münsteri* Wagner. Bourmeister (der fossile Gavial von Boll, Halle 1854) established for this species the older name *M. bollensis* Cuvier. The specimen which you receive is, therefore, the type specimen of the invalid species *M. senckenburgianus* Br.

With the expression of our highest consideration and with friendly greetings, I am,

Yours very sincerely,

ERNST ROEDIGER,  
Director of the Senckenberg Museum of Natural History.

## ONE HUNDRED DOLLARS FOR A FOSSIL EGG FROM MADAGASCAR

**A**N egg that is two feet, eight inches long and two feet, two inches around and that has a capacity of about two gallons is a new possession of the Museum, one hundred dollars having been the purchase price. The specimen is a fossil from Madagascar and has been in the British Museum on loan since 1892. It is unusually perfect, the shell unbroken although finely pitted in places showing effects upon it before it passed into this unchangeable state.

Fossil eggs of this description first came to the notice of scientists in 1850 when discovered in the bed of a torrent in Madagascar. The natives were familiar with them, using them sometimes as vessels for domestic purposes; and these natives had also a tradition of a bird large enough to carry off an ox. At the time of the discovery there was much discussion by scientific men as to whether what came out of these eggs in ancient times was bird or reptile and after a few bones discovered somewhat later decided in favor of bird which was named *Æpyornis*, there was much difference of opinion as to its kind and relationships. Some placed it with dodos, others with auks, and still others with vultures or large birds of prey. Some fifteen years later, in 1867, various less incomplete fossil remains came to light, which decided definitely that the bird was not only of massive proportions, but also that it was short-winged, thus proving its alliance to the *Dinornis* of New Zealand and to the *Apteryx*. Its height was supposed to have been six or seven feet although previous calculations had placed it at twelve feet.

There is no fossil specimen of the bird itself in the American Museum, but exhibited in the Geological Hall are some of its more or less distant relatives, the *Apteryx*, the Moas — fossil New Zealand birds which were nearly wingless — and the gigantic *Dinornis*, standing nine feet high. The egg will be placed on exhibition soon and when seen in comparison with the eggs of birds of ordinary size or even with that of the ostrich will make clear that knowledge of these eggs in prehistoric times may well have given rise in oriental fable to the stories of a giant “roc able to carry off an elephant in its talons.”

MR. W. DEW. MILLER, Assistant in the Department of Mammalogy and Ornithology, has been honored by an appointment as inspector of imported live birds at the Port of New York under the direction of the Chief of the United States Biological Survey.



## MUSEUM NEWS NOTES

SINCE our last issue the following persons have been elected to membership in the Museum:

*Life Members*, MESSRS. ALLISON V. ARMOUR, ARTHUR D. GABAY, WILLIAM PERKINS WADSWORTH and GEN. THOMAS HUBBARD;

*Sustaining Member*, MR. EDWARD J. DE COPPET;

*Annual Members*, MESSRS. PHILIP G. BARTLETT, JULIUS HENRY COHEN, WILLIAM N. COHEN, HARRY A. CUSHING, JULIUS GOLDMAN, EDGAR HUIDEKOPER, FREDERIC E. HUMPHREYS, C. D. HUYLER, MICHAEL JENKINS, S. KELLER, JOHN DRYDEN KUSER, WILLIAM MITCHELL, WILLIAM S. MYERS, CHARLES J. OBERMAYER, JOHN OFFERMAN, EDMUND PENFOLD, F. POEL, JAMES H. SCHMELZEL, R. A. SCHNABEL, HARPER SILLIMAN, CHARLES L. TIFFANY, JOHN J. D. TRENOR, DRS. CHARLES BROWNE, L. PIERCE CLARK, JAMES MORLEY HITZROT, WILLIAM J. MERSEREAU, TEOFILO PARODI, A. EMIL SCHMITT, REV. DR. WALTER THOMPSON, MMES. WILLIAM LANMAN BULL, B. OGDEN CHISOIM, RUFUS COLE, CLARENCE M. HYDE, SAMUEL KEYSER, WILLIAM N. KREMER, JOSEPH SHARDLOW, and MISS EDITH M. KOHLSAAT.

PRESIDENT HENRY FAIRFIELD OSBORN was made Curator Emeritus of the Department of Vertebrate Paleontology at the meeting of the Executive Committee on January 18, 1911.

THE NEW YORK ZOÖLOGICAL SOCIETY has presented to the Museum a series of six hundred animal photographs taken from time to time through a long period of years at the Zoölogical Park.

ONE of the attractive features of the opening of the new South Sea Islands Hall on January 25, 1911, was a collection of thirty-one paintings made among the South Sea Islands by the late John La Farge and loaned by Miss Grace Edith Barnes.

MR. CHARLES L. BERNHEIMER has recently presented to the Museum a splendid collection of whaling implements including harpoons and a bomb gun; also, by the efforts of Mr. Frank Wood of New Bedford, Mass., a complete outfit for a whaling boat has been secured through exchange. These are important additions to the Museum's collections, for even at this date it is exceedingly difficult to get many of the articles which went to make up the equipment used by the deep sea whalers of New Bedford and a few years from now will be quite impossible.

AT the meeting of the Executive Committee on January 18, 1911, Miss Mary C. Dickerson was appointed Curator of the Department of Woods and Forestry and Assistant Curator in Herpetology.

THE Department of Mammalogy and Ornithology has recently received from the Stefánsson-Anderson Arctic Expedition a valuable collection of mammals and birds made during 1909 and 1910 by Dr. R. M. Anderson along the Arctic coast and islands from the Mackenzie delta westward to Point Barrow. The birds include water-fowl and land-birds characteristic of the high North, such as jaeger and other gulls, the spectacled eider and other ducks and geese, various species of shore birds, large series of two species of ptarmigan, Lapland longspurs, redpolls, snow buntings, wheatears, yellow wagtails, horned larks, etc. The mammals include ground squirrels, lemmings, voles, Arctic fox, weasels and shrews. The Colville River was ascended to the Endicott Mountains, in which district were obtained a good series of the white sheep and sixteen specimens of the Barren Ground caribou. The route of the expedition was for the most part through unexplored ground, and the birds and mammals obtained are thus of the highest interest.

### LECTURE ANNOUNCEMENTS

#### MEMBERS' COURSE

The spring course of lectures to Members will be given in March.

#### PEOPLE'S COURSE

Given in coöperation with the City Department of Education.  
Tuesday evenings at 8:15 o'clock. Doors open at 7:30.

The last four of a course of lectures by DR. ARTHUR JUDSON BROWN.

February 7 — "Dependent Korea."

February 14 — "Changing China."

February 21 — "America in the Philippines."

February 28 — "Siam."

Saturday evenings at 8:15 o'clock. Doors open at 7:30.

The last four of a course of eight lectures on Public Health.

February 4 — DR. LIVINGSTON FARRAND, "Tuberculosis: The General Problem; the Organized Campaign against the Disease."

February 11 — DR. JAMES ALEXANDER MILLER, "Tuberculosis as a Social Problem. Method of Treatment."

February 18 — PROF. C-E. A. WINSLOW, "Water Pollution and Water Purification."

February 25 — MR. LAWRENCE VEILLER, "Housing and Health."

#### LEGAL HOLIDAY COURSE

Fully illustrated. Open free to the public. Tickets not required.  
Lectures begin at 3:15 o'clock. Doors open at 2:45.

February 22 — PROF. C-E. A. WINSLOW, "Insect Carriers of Disease."

# Scientific Staff

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HERMON CAREY BUMPUS, Ph.D., Sc.D., LL.D.

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## MINERALOGY

L. P. GRATACAP, Ph.B., A.B., A.M., Curator

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ROY C. ANDREWS, A.B., Assistant in Mammalogy

W. DE W. MILLER, Assistant in Ornithology

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W. D. MATTHEW, Ph.B., A.B., A.M., Ph.D., Acting Curator

WALTER GRANGER, Assistant Curator of Fossil Mammals

BARNUM BROWN, A.B., Assistant Curator of Fossil Reptiles

WILLIAM K. GREGORY, A. B., A. M., Ph.D., Assistant

LOUIS HUSSAKOF, B.S., Ph.D., Associate Curator of Fossil Fishes

JOHN T. NICHOLS, A. B., Assistant Curator of Recent Fishes

MARY CYNTHIA DICKERSON, B.S., Assistant Curator in Herpetology

## ANTHROPOLOGY

CLARK WISSLER, A.B., A.M., Ph.D., Curator

PLINY E. GODDARD, A.B., A.M., Ph.D., Associate Curator

HARLAN I. SMITH, Associate Curator

ROBERT H. LOWIE, A.B., Ph.D., Assistant Curator

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THE AMERICAN MUSEUM  
OF  
NATURAL HISTORY

FOR THE PEOPLE  
FOR EDUCATION  
FOR SCIENCE

# THE AMERICAN MUSEUM JOURNAL

MARCH, 1911

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From *Annales du Musée du Congo*

OKAPIA JOHNSTONI SCLATER. ADULT MALE. MOUNTED UNDER THE DIRECTION  
OF M. DE PAUW AT THE UNIVERSITY OF BRUSSELS



# The American Museum Journal

VOL. XI

MARCH, 1911

No. 3

## THE OKAPI

BY J. A. ALLEN

*The American authority on mammals, Professor J. A. Allen, gives in the following an account of the okapi, of its discovery in 1901 when it was thought to be a relative of the horse, of the proof later in the same year that it is related to the giraffe and to certain extinct forms from the Miocene of southern Europe and of India. Although the okapi has been known for a space of ten years and is covered by a literature of more than half a hundred titles from the study of okapi skins and skeletons, the living animal, at least till recently, has never been seen in its native haunts by a white man and the realistic okapi group to be constructed in the American Museum as a result of the six months' work of the Museum's Congo Expedition in the Great Forest of Africa will prove a notable event in the scientific world.*

ON November 20, 1900, a letter was read at a meeting of the Zoölogical Society of London from Sir Harry Johnston, announcing that he had obtained evidence "of the existence of a very remarkable new horse," which appeared to inhabit the Great Congo Forest. At the Belgian post of Mbéni he found that this animal was called "okapi" by the Bambuba natives of the region, and he was fortunate enough to obtain pieces of the skin that had been made into waist-belts and bandoliers. These pieces exhibited the stripes of the legs and hind quarters, and indicated an animal different from any known zebra or wild ass. These fragments were forwarded by Sir Harry to the Secretary of the Zoölogical Society and exhibited at a meeting of the Society held December 18, 1900. Thus was obtained the first definite knowledge of a horse-like animal marked with black and white stripes referred to by early Dutch and Portuguese writers as existing in the great forests of Central Africa.

At a meeting of the London Society held February 5, 1901, these fragments were shown and described by Dr. P. L. Selater as representing a new species of zebra, which he named after its discoverer, Sir Harry Johnston, *Equus johnstoni*, the reference of the species to *Equus* being tentative. At a meeting of the Zoölogical Society held three months later (May 7, 1901),

Dr. Selater exhibited a water-color drawing of the animal made by Sir Harry Johnston from a fresh skin secured through the Belgian authorities of Fort Mbéni. From this drawing it became evident that the new animal was not a zebra, nor even a member of the family *Equidae*, but a species allied to the giraffe. The drawing was published as Plate I of Volume II of the *Proceedings* of the Zoölogical Society for 1901. This skin and also two skulls, obtained by native soldiers of the Congo Free State near Fort Mbéni, were forwarded by Sir Harry to the British Museum, where they arrived June 17, 1901, and served as the basis of a paper presented by Professor E. Ray Lankester the following day at a meeting of the Zoölogical Society. From these specimens he was able to give the principal characters of this strange animal and discuss its relationships. He found it to represent a new genus, allied to the giraffe and also to certain extinct forms from the Miocene of southern Europe and India. He gave to the new genus the name *Okapia*.

This skin was mounted by Rowland Ward for the British Museum, where it was placed on exhibition in August, 1901 — the first example of the “mysterious okapi” installed for public exhibition. Colored drawings of the mounted specimen were immediately given wide publicity in various popular as well as scientific publications. The discovery of an animal so strange and striking naturally excited great interest, and the okapi was soon famous throughout the world.

Since 1901 numerous specimens of this animal have been taken in the Congo region, nearly all of them through the agency of the Belgian Government. They include not only skins and skulls of adults of both sexes and of various ages, but also a number of complete skeletons, representing altogether some thirty or more individuals. While much of this material has been retained for the museums of Belgium, many specimens have been presented, by direction of the late King Leopold II, to other European museums. Permission has also been generously granted to several private expeditions of other nationalities to enter the Congo Free State in pursuit of the okapi, but apparently they have met with little success, except in the case of the Alexander Gossling expedition, which secured skins, skulls and skeletons for the British Museum, and, as noted below, of the Lang-Chapin Congo Expedition of the American Museum.

The material thus acquired by European museums, notably that in the Museum at Tervueren, has furnished the basis for several important monographs of the species, and for a large number of minor papers, resulting in an okapi literature numbering more than half a hundred titles, so that the external and osteological characters and the affinities of few species are now better known than are those of the okapi.

In the character of limbs and length of neck the okapi differs little from the ordinary type of ruminant, as for example a deer or an antelope. Although it differs widely in external appearance from the giraffe which has elongated limbs and enormously lengthened cervical vertebrae, the structure of the skull and teeth show it to be a member of the giraffe family. It has also two small frontal horns, somewhat similar to those of the giraffe but less developed, differing in this respect from ordinary ruminants. The lips are not prehensile and its small eyes give the head somewhat the appearance of that of a deer. The colored plate of the okapi sufficiently indicates its general appearance in respect to form and peculiar coloration.

The okapi is said to live in pairs in the depths of the forest and to feed on the leaves of the undergrowth. Up to a recent date it was said that no white man had ever seen the living okapi in its native haunts, or was likely to, as it is extremely wary and shy, and nocturnal in its habits. The specimens taken have all been captured by the natives, who are said to be able sometimes to steal up to the animals and kill them with spears, but usually they take them in traps. Sir Harry Johnston, in an account of his trip to the Congo Forest for okapi, thus speaks of its haunts: "Provided with guides, we entered the awesome depths of the Congo Forest. For several days we searched for the okapi, but in vain. We were shown its supposed tracks by the natives. . . . The atmosphere of the forest was almost unbearably with its Turkish-bath heat, its reeking moisture, and its powerful smell of decaying, rotting vegetation. We seemed, in fact, to be transported back to Miocene times, to an age and a climate scarcely suitable for the modern type of real humanity. Severe attacks of fever prostrated not only the Europeans but all the black men of the party, and we were obliged to give up the search and return to the grass-lands with such fragments of the skin as I had been able to purchase from the natives."

It was on the borders of such a region that the members of the American Museum Congo Expedition, under the leadership of Herbert Lang and James Chapin, camped for nearly six months and were successful in obtaining specimens of the okapi and the necessary accessories for a large realistic group of these animals for this Museum. While the Congo Expedition is to be congratulated on the results of its laborious efforts, these were rendered possible only through the generous and hearty coöperation of the officials of the Congo Free State under most favorable instructions from the Belgian Government. All the specimens were trapped by the natives by means of nooses set in the "terrible swamps" of the Great Congo Forest.



Seen near at hand the poles are grotesque, some of them still exhibiting even after the many years of exposure to wind and weather faint traces of the color with which they were originally painted. Totem poles mark the area of the North Pacific Coast culture, which extends from Puget Sound to the Eskimo country in southern Alaska. These Bella Coola totem poles are now in the American Museum. (The Indians would not sell the carved human figures on top)

## TOTEM POLES OF THE NORTH PACIFIC COAST

HUGE CEDAR CARVINGS OFTEN SO OLD THAT THE INDIANS THEMSELVES HAVE FORGOTTEN THEIR MEANINGS. EACH TOTEM POLE TELLS SOME ANCESTRAL LEGEND OR IS THE "BADGE" OF A FAMILY OR CLAN

*By Harlan I. Smith*

Photographs by the Author

**I**N some villages of the North Pacific Coast of America a totem pole stands in front of each house and the houses stand in a row facing the sea. From a distance the poles look like stubs of a dead forest fringing the edge of the sea and not till one approaches nearer do the squatty houses appear nestled in the vegetation just back of them. When seen near at hand the poles are grotesque, some of them still exhibiting, even after the many years of exposure to wind and weather, faint traces of the color with which they were originally painted.

Totem poles are a conspicuous feature of any village on the North Pacific Coast of America, so conspicuous indeed that the Indian tribes living here have sometimes been called "Totem Pole Indians." The poles mark the area of the North Pacific Coast culture, which extends from the vicinity of Puget Sound along the coast to the Eskimo country in southern Alaska. The influence of this culture, to be sure, extends southward along the coast but at Puget Sound it begins to lose its strongest characteristics. Indications of its influence are found also in the interior especially along the water-ways. Some of the best totem poles are not seen by the tourist who makes the delightful scenic trip to Alaska by way of the calm inland



TAMANAWAS BOARD, BAY CENTER,  
WASHINGTON

This crude carving, now in the possession of the Museum, shows totem pole influence south of the North Pacific Coast culture area

passage, but are to be found in remote villages far up some of the mighty rivers of the North Pacific Coast.

Totem poles are carved from cedar. On this rainy foggy coast which is never very hot in summer nor bitter cold in winter, the forests are noted for their gigantic cedars. The Indians here are preëminently a woodworking people; they have become clever in the arts of splitting, bending, splicing, carving and inlaying. The house is made from split cedar planks on a framework of adzed cedar logs. The canoe is dug out of a huge cedar trunk. Much of the clothing is made by weaving shredded cedar bark. Spear handles are whittled out of cedar wood while the masks used in the ceremonies are also often carved from cedar.

The carvings on the poles most often represent animals, among those commonly shown being the beaver, bear, raven, frog, finback whale and squid. Mythical monsters are also represented, while the human face and figure are common. Sometimes the carved figure of a man forms the top



THE TOTEM POLES STAND IN A ROW FACING THE SEA  
Skidegate, Queen Charlotte Islands

of a totem pole to represent the speaker or orator employed by an Indian host giving a banquet or by a financier making an investment somewhat as we have a lawyer represent us at court. Some of these are hollow figures in which a slave or servant may be secreted to make speeches through the open mouth. Frequently such a figure is carved standing upon the head of another carved figure representing a slave, tending to show that the owner of the house was rich in slaves.

The art of the average totem pole is on the whole symbolic and conventional though rather realistic in appearance. This is true not only in the case of the totem poles but also in nearly all of the art of the Northwest Coast peoples. On the other hand, the same motifs, animal and human, may be employed for purely decorative purposes and some of the baskets and occasionally blankets show geometric designs, many of which, however, probably symbolize ideas also, while decorative carvings without symbolic meaning may be inserted here and there on a totem pole to fill up blank spaces between the symbolic carvings. One method of conventionalizing a carving frequently consists in exaggerating some salient feature of the animal represented; for instance the carvings of a beaver and a wolf look very much alike except that the beaver is indicated by prominent incisors and a flat tail. Again, the artist has sometimes distorted to fit the field what would otherwise have been a nearly realistic figure or a slightly conventionalized one. It must not be forgotten that among Indians as among other peoples great artists are rare, and that men of wealth who desire to have a fine totem pole must pay enormous prices in such things as blankets, canoes or slaves in order to have the most perfect work.

Carved house and grave posts are akin to totem poles. On entering the houses we find that some of the posts supporting the rafters are carved so much like totem poles that where a house has gone to decay and only the posts remain, they may quite naturally be mistaken for small totem poles. Sometimes the house posts are plain, and carved posts which do not bear any



Tlingit modern totem pole at Wrangel, Alaska, contrasting sharply in idea with a mission church near. The lowest carving is a beaver as shown by the teeth and tail

Before the  
Chief's house,  
Wrangel



Looking out  
to sea at Old  
Wrangel



part of the weight of the frame are placed against them. Again if one pushes through the nettles and salmon-berry bushes to the graveyard, he will find there many carved posts which may be mistaken for little totem poles.

There is another object which when removed from its proper position resembles the totem pole: this is the carved "grease trough." It is supported like the ridgepole of a house in such a position that it hangs above the fire, a magnificent chandelier, and the grease with which it is filled runs out of the giant carved mouth and falling upon the fire causes it to blaze up and illuminate the surroundings — probably at the festivities of some great banquet to the honor of the host and his family.

The style of the totem pole and of other carved posts varies more or less from tribe to tribe. Grave posts and house posts among the Salish tribes of Puget Sound are rather flat bas-reliefs and there are few, if any, tall totem poles. Among the Haida the totem poles are tall, massive, carved in the round and of excellent workmanship. Totem poles are rare among the Nootka and though this tribe makes many small figures of wood, these are not of excellent workmanship. At Victoria I found a Nootka Indian carving a large totem pole and learned that he was copying to order from a photograph a Haida pole for a curio dealer. The curio dealer informed me that he intended to put this on the roof until it was weathered enough to resemble an old pole. Sepulchres are made in some totem poles, notably among the Haida and Tlingit. There are several poles of this type at Wrangel. Such totem poles have at the back some distance from the ground a niche in which the body is placed.

The complete significance of a totem pole



is not always clear to-day even to the Indians themselves because the original meaning of the carvings and paintings has in many cases been forgotten. Also, although some of the most competent American anthropologists have seen and described these poles of the North Pacific Coast, the interpretations they have given of them have only too often been avowedly incomplete. Probably on some of the poles the carved figures illustrate a legendary dream or exploit of the ancestor of a family or clan. This legend is, then, the property of the family and together with the family dance and song is often believed to have been obtained by the ancestor from the totem animal. Thus the totem animal has come to be regarded as the "badge" of the family or clan, somewhat as the eagle is the symbol of the United States. Although the totem animal does frequently figure as the guardian of the family or clan, these animals must be sharply differentiated from the guardian spirits of the eastern Indians, in so far as the totem animals have come into relation to the family through the ancestors of the groups and not through any living individuals belonging to the group. Property sentiment has become strongly associated with the poles and the ideas the poles stand for so that no two families can be found claiming identical totem poles. Often the meaning of any given pole has become very complex because marriages and important family events, such as great potlatches or the killing of slaves in order to show the great wealth of their owner may have been inserted on the pole in carvings additional to those representing the traditional legend.

It has been found difficult to get totem poles for the Museum. In the first place they



Overgrown  
with grasses  
and vines, Old  
Wrangel



Primitive  
art at Old  
Wrangel

are seldom if ever owned by an individual but rather by a family or group and it is as difficult to close a deal with them all as to get a quit claim deed from all the heirs of an estate. The second reason for the difficulty in getting possession of totem poles is that the Indians who still retain their regard for old customs and institutions will not think of parting with one of these symbols of aristocracy, which is also interwoven with their religious ideas. If, on the other hand, the Museum representative goes to the Indians who have been under the influence of missionaries and Government teachers, he finds that they have no totem poles, for almost as fast as the Indian loses his regard for the totem poles he is willing to chop them up and burn them. He is often urged to do so by the missionaries who desire to remove every reminder of the old life, believing that the Indian will then quickly adjust himself to the new ways taught by the white men.

Notwithstanding the difficulty in getting possession of totem poles, the American Museum is relatively rich in these primitive carvings, the Haida and Kwakiutl being best represented, the Tlingit and Tsimshian least satisfactorily. Altogether there are some fifty specimens in the Museum's collection which for the most part is on exhibition in the North Pacific Hall.

House post from Comox, British Columbia, now in the American Museum. Speaker represented as standing on the head of a slave.



Carved house post, Bella Bella

## A GIFT FROM ECUADOR

*By Charles W. Mead*

THE collection presented recently to the Museum by Mr. D. C. Stapleton contains two stone seats found near the Port of Manta, Province of Manabi, Ecuador. Such stone seats have been discovered in great numbers on the summits of Cerro de Hojas, Cerro Jaboncillo, Cerra Jupa and Cerro Agua Nuevo and form the most remarkable feature of the archaeology of Manabi, nothing resembling them being known from any other part of the Americas.

The specimens in the various museums of Europe and America have come for the most part from Cerro de Hojas, found in prehistoric house sites. All of these seats appear to have been carved from andersite or from argillaceous shaly sandstone—the two presented by Mr. Stapleton are of the latter—and all may be described as U-shaped, although there is considerable variety in their width and in the curve of the sides. Usually the crouching figure supporting the seat represents a man or a puma, but bird, lizard, bat and monkey-like forms also occur and some specimens have been found in which the supports and bases are without figures.

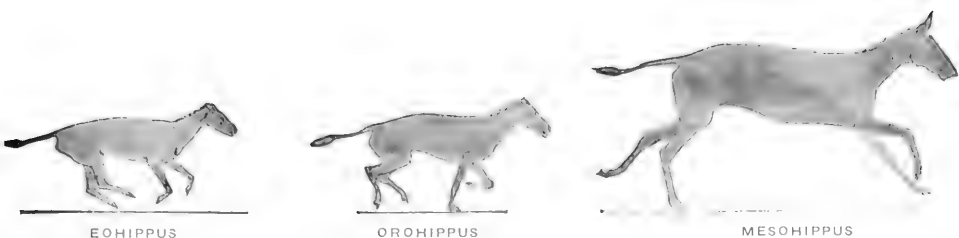


In addition to the stone seats from Manabi, Mr. Stapleton's gift to the Museum includes some thirty specimens from the Province of Esmeraldas, about one-half of which were excavated from prehistoric burial mounds, the balance coming from the Cayapa Indians who inhabit the province to-day.

Of the archaeological part of the collection, second to the stone seats in interest are the pottery stamps as showing the status of the ornamental art of this unknown people. In all probability these stamps were used to ornament cotton and bark cloth.



This skeleton was found in the bad lands south of the Gray Bull River, Big Horn Basin, Wyoming. It was imbedded in a stratum of gray shale and was brought to the notice of the prospector by a few fragments of the hind limbs which had weathered out and lay on the slope of the knoll



## A NEW SPECIMEN OF THE FOUR TOED HORSE

EARLIEST KNOWN ANCESTOR OF THE MODERN HORSE, THE SMALL FOUR-TOED *EOHIPPIUS*, DISCOVERED IN THE BAD LANDS OF WYOMING

*By Walter Granger*

THE continent of North America has produced the most complete and best preserved fossil remains of the horse; and it chances that of all institutions, the American Museum possesses the finest collection of fossil horses. Aside from fragmentary material, there are eight mounted skeletons in the Hall of Fossils, covering a remarkable series of connecting links from the little four-toed *Eohippus* of the early Eocene to the large, modernized, one-toed *Equus* of the Pleistocene or Glacial Period, at which time the horse became extinct in North America.

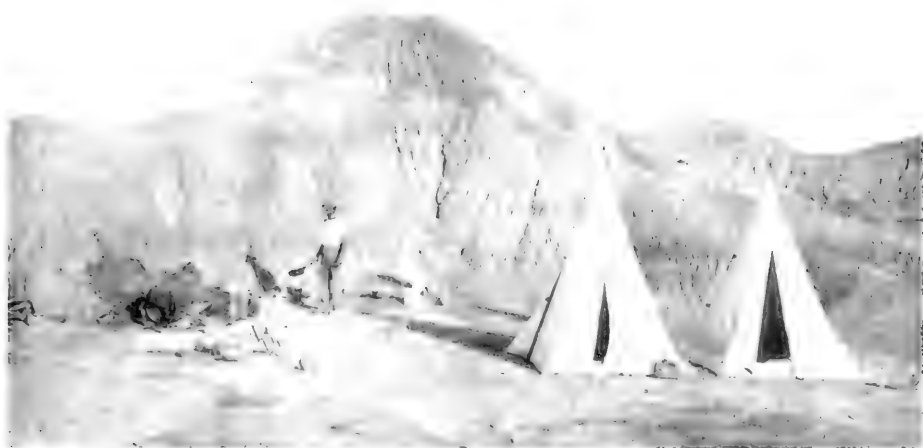
The skeleton of *Eohippus* at present mounted in the Museum is of the most advanced species of that genus and is from the Wind River formation of Wyoming. It was of especial interest therefore, when the expedition of the Department of Vertebrate Palæontology sent to Wyoming the past summer, discovered a nearly complete skeleton of one of the most primitive species of *Eohippus*, previously known to science merely by fragments of jaws containing the teeth. This was found in the extreme northwestern corner of Wyoming, in the Wasatch formation of the Big Horn Basin.

After the close of the great Age of Reptiles, at a time roughly estimated at 3,000,000 years ago when the region was at sea level, there occurred an uplifting of mountain ranges and a general elevation of the country. The Big Horn Basin was one of several formed by this raising of mountain chains, and into the basin ran the sediment washed from the rocks of the higher surrounding regions. Here in a moist, warm climate and probably with an abundance of vegetation, many primitive mammals including the little *Eohippus* lived and died, and their bones became buried in the slowly accumulating clays and sands, and eventually petrified. Approximately these conditions existed until there had been deposited in this Basin a great mass of sediment 2,000 feet thick; the Basin was nearly filled and a drain-

age outlet to the north into the Missouri River was formed. Then conditions changed, the process of deposition ceased, and that of erosion began and has continued to the present time. To-day the Big Horn Basin is 4,000 feet above sea level in its lowest parts, it is arid, in fact almost barren except along the few water courses which lead down from the mountains, and the erosion has removed the greater part of the original 2,000 feet of sandstone and clay. A few high, flat-topped buttes, left by the erosion, indicate the level of the Basin at the time when the erosion began, but for the most part the formation has been worn down nearly to its base, and the country presents great areas of low, rounded knolls and sharp, steep ridges comprised chiefly of gray and red hard, brittle clays with occasional layers of sandstone, and often absolutely bare of any vegetation. Such areas are known to the geologist as "bad lands," and it is here that the fossil collector makes his search for the petrified remains of these ancient animals. As the hills are slowly worn away by the heavy spring rains or an occasional cloud-burst in summer, the bones which have been entombed for so long can be detected by the trained eye of the prospector. Often it is merely a worthless fragment of bone, sometimes a fragment of jaw or a skull, and in rare cases a nearly complete skeleton such as the present one. In such instances it is probable that the body of the animal became buried soon after its death, before the bones could be scattered by carrion eaters or by the action of water or other agents.

The present skeleton was found by Mr. William Stein, who has been employed as cook and teamster of the Wyoming expeditions for several seasons and who spends his spare time in searching the bad lands, with the rest of the party. The finding of fossils is largely a matter of keen eyesight, of a certain amount of training in knowing what to look for, and of ability to spend long days walking or slowly riding through the broiling heat of the bad lands. It was the bleached fragments of the bones of the hind legs which attracted the attention of the collector as they lay on the sloping surface of a knoll. These surface fragments were carefully gathered up, and a little careful prospecting showed the hip and backbone of the animal extending into the solid clay of which the knoll is composed. By removing the overlying rock the whole upper part of the skeleton was exposed as it lay on its side in a horizontal position. Instead of removing the bones one by one from the rock, the whole skeleton was taken out, with such of the encasing rock as was necessary, the entire mass being bound up, as is usual in collecting such specimens, in heavy bandages of burlap and paste.

In the laboratory the bandages will be removed, and the slow, rather tedious task of removing the small and extremely fragile bones from the rock will begin. It took three days to excavate the specimen in the field,



One of the Expedition's "Dry Camps" in the heart of the fossil fields south of the Gray Bull River. Dr. Sinclair and Mr. Olsen, two members of the expedition, worked for more than a month from these dry camps, which were supplied periodically with water and provisions from the main camp on the river.



Prospecting in Wind River Basin, Wyoming. Much of the preliminary prospecting and the geological reconnaissance work is done on horseback but the actual search for small fossils must be done afoot.



*Eohippus*, the four-toed horse. Restoration by Charles R. Knight. The animals were scarcely larger than the red fox

but it will probably require three weeks to free the bones from the matrix, before the mounting of the skeleton for exhibition can be commenced.

As the work of clearing the rock progresses, one point of anatomy will be keenly watched, and that is, whether this earliest known horse possesses the remnant of a fifth toe on the front foot and of the fourth toe on the hind foot. If it does, this places it a decided step nearer to the still earlier but yet undiscovered ancestor of the horse, which undoubtedly possessed five toes on both fore and hind feet.





## PRESERVATION OF MAMMAL SKINS IN THE FIELD

*By James L. Clark*

[Mr. James L. Clark was at one time animal sculptor in the American Museum and has recently spent fourteen months on a hunting trip in Africa. His account of the practical field work necessary for the preservation of the skins of large animals will be followed by an account of the task of the animal sculptor in the Museum who builds on the work done in the field in Africa to make these animals "live" for the people of another continent in the American institution's exhibition halls.— Editor]

FROM the point of view of the majority of visitors to the Museum, who see mounted and often wonderfully lifelike animals exhibited there, it is unlikely that the initial labor, and in a large number of cases the perils encountered in securing the material for the finished work, are at all considered. They probably go no deeper into the matter than that the rhino, for instance, was killed in Africa, transported overseas and set up for public instruction. But the actual work and how it is accomplished by the collector in the field, the endurance of hardships, the skill and perseverance necessary in the pursuit of specimens, is little known.

In making a collection the work in the field must often be carried on under the most unfavorable conditions. In the case of a large animal, for example, this work must be done just where the kill is made, whether in a swamp, on a rocky ledge or a sun-scorched plain. Under the most trying circumstances the collector's one anxiety and aim must be as always for perfect results, and he must gather all data, field notes and measurements, sketches and photographs that will add to a fuller knowledge of the animal and thus assist in its restoration later by the taxidermist.

Perhaps the Museum has planned a group of animals and has decided what particular species shall be displayed. The collector is then sent into



*Photograph by Kermit Roosevelt*  
Copyright by Charles Scribner's Sons

Native boy carrying in a leopard shot by Kermit Roosevelt<sup>1</sup>

<sup>1</sup> This photograph and the one on page 93 together with the photographs of white rhinos and elephants in the January JOURNAL are from Colonel Roosevelt's *African Game Trails* and are used through the courtesy of the author and publishers of that book.



*Photograph by James L. Clark*

The taxidermist's work of measuring and skinning the hippo must usually be done in the water. Kisii boys are waiting to get the meat, which they consider the best of all African game because it has a large amount of delicious fat

the field to gather the necessary material. He it is who picks from the herd the specimens which will best show the physical differences at varying ages, or in the case of horned animals, it may be a series of males which will illustrate the growth of the horns from the young spikehorn to the matured and typical horn or antler.

After the selected specimen has fallen to the rifle, photographic records must be made, for they prove most valuable to the taxidermist, not only in showing the animal in full but also in furnishing important details of both front and side views. If possible a plaster cast of the face or entire head is made. Careful description is essential as to the color of the eyes, eyelids and nostrils or any fleshy portion which may undergo a change when the skin is dried, and exact measurements of the body and limbs are recorded.

Great difficulty is frequently encountered when collecting hippos, for

they are often shot while they are in deep water, where they may sink to the bottom or float down stream. Because of this many fine specimens have been lost. The surest way is to surprise and shoot them on shore, if possible. This must be done at night however, as during the day they readily scent approaching danger and rarely leave the water. The best method therefore in shooting the hippo is to plan the work at a point where the carcass if it drifts down stream, will lodge in the shallows or on a sand bar. Then the "boys" (natives) gather about and roll it as near the shore as possible. But even then it is likely that all the measuring and cutting up must be done in the water.

After careful taking of notes and measurements, the carcass is skinned. The African natives, and especially those of the Wakamba tribe, are very skillful with the knife and are of great assistance in this work. One boy, in particular, could take a specimen as large as a zebra, skin it perfectly, with the legs "round" (that is, not cut), salt, dry and fold it for carrying.

Not a scrap of flesh goes to waste as the natives are decidedly carnivorous. If several animals have been killed all the meat is carried to camp, and after the choicest parts have



*Photograph by James L. Clark*

Giraffe (female) of the five-horned variety. Photographs and color studies are made for use in the later mounting of the skin.



*Photograph by James L. Clark*

Impalla, considered by many the most beautiful buck in British East Africa



*Photographs by James L. Clark*

Head studies of a female elephant on the Guasha Ngisu Plateau. This elephant, accompanied by its young, charged Mr. Akeley and Mr. Clark and had to be killed when it reached some thirty-five yards distance

been laid aside for the collector and his party, the rest is given to the boys, who, after eating all they possibly can, dry what is left and later, when on the march, trade portions of it for milk, honey and potatoes.

For the preservation of skins nothing can surpass common table salt. This is not only a preservative but it also draws out so much water that the salt is dissolved and the skin dries rapidly. By leaving the skin rolled up for some hours after treatment, the salt is absorbed into the tissues and remains there after the drying out. Decomposition must be carefully guarded against until after a skin is once dried, when the danger is very slight. Even with a salted skin which cannot be opened flat, there is the possibility of its "sweating" in the folds during drying. These places therefore must be closely watched and the skin turned about to allow the air to reach them. If facilities are at hand, the best

results are obtained by placing the skin in brine after it has been left rolled up in salt for several hours; the skin will be kept not only soft but as well protected from the ravages of destroying insects as though placed in cold storage.

Forced drying, near a fire or in the strong sun, is a method treacherous in its results, but may be successful if great care is taken that the skin is not allowed to become too hot. The method of drying without the aid of

salt or other preservative is sometimes necessary. With this method of drying, the skin must be pegged or stretched out perfectly flat, although such pegs or ropes often cause ugly holes or distort the skin so that there is difficulty in restoring it to its natural shape. In the case of a valuable specimen when no other means are available, this method is better than none.

Salt is a great aid in softening the skin when finally to be prepared for mounting. That which has remained in the tissues readily absorbs the water in which the skin is put to soften and the time thus consumed in the process is very short. With a sun-dried skin, on the other hand, it will sometimes be days before the heavier parts are thoroughly soaked, and meanwhile the thinner portions must also remain wet and run the danger of the decomposition which will cause the hair or epidermis to "slip." It would naturally be supposed that dried skins could be softened in salted water, which would at the same time act as a preservative. This, however, is not the case. A skin will soften only in fresh water.



*Photograph by Kermit Roosevelt*

Copyright by Charles Scribner's Sons

Group of skin-laden mules passing by the Bondoni waterhole on the way to the railroad

To preserve heavy skins successfully, like those of the rhino, hippo and elephant, which may be one and one-half inches thick at certain points, it is imperative that they be salted immediately upon removal, and after that they should at once be cut or shaved down on the flesh side to about half an inch in thickness. Then fine salt, generously applied, will penetrate through the tissues to the epidermis or base of the outer skin, preserving it and holding the hair tightly in place. As this outer skin is a natural waterproof covering to the animal, it does not absorb readily and all treatment must be applied to the flesh side. Powdered alum may be used locally, but only when absolutely necessary, as it hardens the tissues to such an extent that no "life" or elasticity returns when the skin is finally prepared for mounting.

Climate plays an important part in the successful preparation of skins and for this reason the dry, tropical atmospheric conditions of Africa are ideal. The power of the sun is tempered by a morning and evening breeze, not only grateful to human beings, but also very useful in rapid drying. For example, a zebra skin if hung up in the early morning will be dry by nightfall. During the rainy season — from about the middle of March to the middle of June and again in the month of November — drying is more difficult, owing, of course, to the amount of moisture in the air. But nearly every day during this season there is a brief period of warm sunshine so that a salted skin may even then be properly dried.

The preservation of the skeleton, particularly the bones of the legs, shoulderblades and pelvis, in addition to the skull, is of the greatest importance as they are necessary later in the proper mounting of a specimen, since the taxidermist must set them up in their proper position and model with clay the correct anatomy of the muscles about them.

The method of transporting the accumulated specimens in the field in Africa is of necessity a primitive and often a difficult one. The entire outfit is made up into sixty-pound loads and carried on the heads of the natives, unless some load prove too heavy for one in which case it is carried, likewise, on a pole between two bearers. When the amount of material to be transported becomes very large a base camp is established, and the specimens stored there in the care of two or more porters, until such time as the trophies can be sent to a railroad station and shipped as direct as may be to the Museum.

## FLEA CARRIERS OF THE PLAGUE

THE PLAGUE GERM IN MAN IS IDENTICAL WITH THAT IN THE RAT AND  
FLEAS MAY CARRY THE GERM TO MAN

*By Frank E. Lutz*

SCIENCE was late in discovering and the world in accepting the knowledge that insects may be common carriers of disease. In fact it is not so very many years since science isolated the minute germs themselves for identification in such cases as typhoid, malaria, yellow fever and plague. To-day flies and mosquitoes stand convicted the world over as carriers of disease germs and the warfare against them is well on. In this case there are three factors concerned in the battle and man conquers the germ by exterminating the insect.

Fleas as disease carriers have been conspicuously before the world of late; they also stand convicted, but the question concerns the interrelationship of four: man, the flea as carrier, the rat or other animal on which the flea is parasitic and the disease germ. Again warfare is against the insect but to be successful it must be directed with full force against the rat, its host. Would that in all instances the whole trio — rat, flea and germ —

Head of rat  
flea. Many  
plague germs  
may be carried  
on the mouth  
parts of a flea



and 5000 or  
more in the  
stomach where  
they will live  
for 15 to 20  
days

*Photomicrograph<sup>1</sup>*

<sup>1</sup> Flea illustrations from Doane's *Insects and Disease* by courtesy of Henry Holt and Company. Other cuts by courtesy of *McClure's* and *Country Life in America*

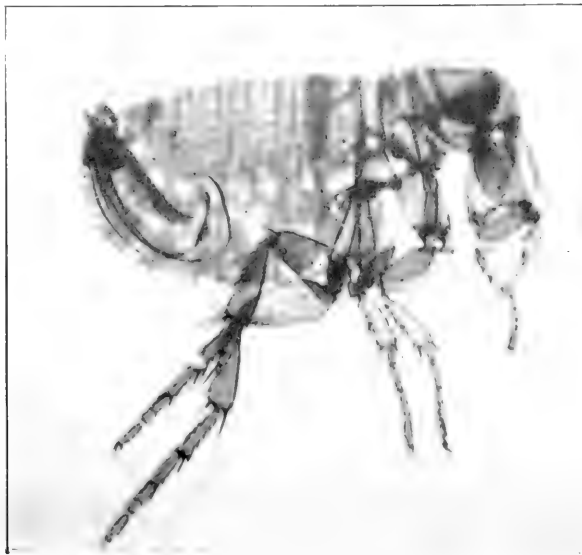


Human flea, *Pulex irritans*, found in all parts of the inhabited globe. Occasionally occurs on cat and dog, rats and mice

could be put out of existence as easily as they are said to have been on incoming ocean liners in San Francisco harbor. These vessels are nearly gas-tight and two tons of sulphur were used to fill up and fumigate each one for five hours, after which it is reported that fifteen to twenty buckets of dead rats were removed.

The heavy ravages of plague now raging in parts of the Chinese

and Russian empires, where little has been done to strike at the acknowledged purveyor of the disease, stand strongly contrasted with the very small loss of life from the recent outbreak in San Francisco. That the



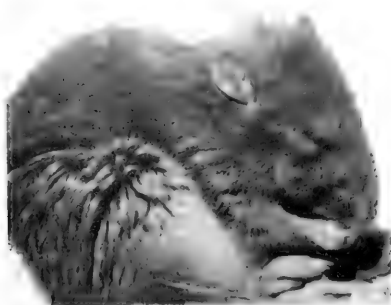
The rat flea, *Xenopsylla cheopis*, is the "plague flea" but the human flea and the cat and dog flea live on the rat also and thus may carry plague germs as well



plague reappeared in all parts of that city in 1907 after having been stamped out in Chinatown in 1900 was probably due to the scattering of the city's rats during the earthquake and fire. Energy was directed at once however toward the extermination of the rats, fully one million were killed, and as a result the plague was checked.

It is known now that an outbreak of plague is always preceded by a similar scourge among rats, because bubonic plague is primarily a rat disease. Yet so blind has the world been to the interrelations of animals and man in cases of infectious disease that notwithstanding the terrible inroads made by the "black death" in various parts of the world during historic times, no report is made prior to 1800 of the coincident inroad upon rats. It was in 1894 that Yersin of the Pasteur Institute isolated the bubonic plague bacillus (*Bacillus pestis*) and proved the germ to be the same in rats and man. But this was only a few years ago. Knowledge came late. Bubonic plague had well-nigh encircled the globe before this, breaking out first in seaboard places probably having travelled from country to country among ship rats. The effect of this discovery which turned the attack upon the rat is shown well in Bombay where the death rate of 20,788 in 1903 was reduced to 5,197 in 1909.

As yet the rats of the northeastern United States are not plague infected, but this is not necessarily a permanent condition. There may be at any time in New York or other eastern seaport an outbreak of plague such as occurred in Suffolk, England, last September. For plague is not limited to the tropics or semi-tropics although it has flourished there because of less sanitary conditions. Fleas are common in the eastern states. Inquiries concerning them reach the Museum at all seasons of the year, but



Washing his face and scratching his ear in rat contentment. The brown or "Norway" rat, *Mus decumanus*, which has today colonized well nigh the whole earth driving to the wall the black rat, *Mus rattus*, the species of romance and history. He is more "sinned against than sinning" in the plague matter for bubonic plague is a rat disease, in any given outbreak the rat mortality being to human mortality as ten to one

especially in the fall after houses which have been closed during the summer are reopened. Larval fleas have uninterrupted opportunity during the summer to develop into adults which sometimes make a house literally uninhabitable. Fleas are considered degenerate members of the Diptera, the order to which flies and mosquitoes belong, and they are wingless, winglessness often accompanying the parasitic state, perhaps through disuse of these organs. That the flea lacks wings may make the spread of plague less rapid; the lack of flight powers, however, is counteracted by the fact that fleas are carried long distances by their hosts.

In the East, practically the only flea that gains access to the house is the cat and dog flea (*Ctenocephalus canis*), the human flea (*Pulex irritans*) being rare. Measures for ridding a house of fleas must plan to attack not only the adults but also the eggs and larvæ. These are likely to be in the dust of the animal's bed and in cracks and crevices about the house and furniture. The remedy lies in making it impossible for the eggs to develop and the larvæ to live in these places, in providing for the cat and dog sleeping places that can be kept clean with all dust removed and burned. A liberal use of pyrethrum powder should be made in all places where it is possible that flea eggs may have fallen. Kerosene or benzine are valuable if milder means do not suffice while in extreme cases fumigation with hydrocyanic acid may be necessary.

The rat flea (*Xenopsylla cheopis*) is known as the "plague flea," but both the human flea and the cat and dog flea also live on the rat so that any one of these may act as a carrier of the plague germ if they chance to travel from a plague-infected rat.

It has developed through a few deaths in California directly traceable to handling ground squirrels that here too danger lies, that the plague bacilli have reached these rodents probably from rats which use the squirrels' holes in fields. The discovery may mean the necessity of extermination of the squirrels in infected regions.



## ANNUAL MEETING OF THE BOARD OF TRUSTEES

THE Forty-second Annual Meeting of the Trustees of the American Museum of Natural History was held on Monday, February 13, 1911, at the residence of the late William E. Dodge, where the Trustees were the guests of Mr. Cleveland H. Dodge. The following were elected officers for the ensuing year: President, Henry Fairfield Osborn; First Vice-President, Cleveland H. Dodge; Second Vice-President, J. Pierpont Morgan, Jr.; Treasurer, Charles Lanier; Secretary, Archer M. Huntington.

Dr. Walter E. James and Mr. Madison Grant of the Zoölogical Society were elected as new members of the Board to fill vacancies in the Classes of 1915 and 1912 respectively.

Resolutions were adopted with reference to Mr. J. Hampden Robb, Secretary, who died January 21 after a brief illness. For more than twenty-five years Mr. Robb has been an active member of the Board of Trustees of the American Museum.

Dr. Charles H. Townsend was appointed to continue in the administrative office of Acting Director, with the understanding that he will return later to the direction of the New York Aquarium, and Mr. George H. Sherwood was reappointed Assistant Secretary. The United States Trust Company was made Assistant Treasurer.

The scientific staff for the year 1911 was approved, involving the following promotions and appointments —

Department of Vertebrate Palæontology: Dr. W. D. Matthew, from Acting Curator to Curator; Mr. Barnum Brown from Assistant Curator to Associate Curator of Fossil Reptiles; Mr. Walter Granger from Assistant Curator to Associate Curator of Fossil Mammals;

Department of Mammalogy and Ornithology: Mr. Roy C. Andrews from Assistant in Mammalogy to Assistant Curator of Mammalogy; Mr. W. DeW. Miller from Assistant in Ornithology to Assistant Curator of Ornithology;

Department of Public Health: Mr. John Henry O'Neill, Assistant;

Department of Ichthyology and Herpetology: Professor Bashford Dean of Columbia University, Curator.

The expenditures for the past year were reported as follows:

By the City . . . . .	\$185,757.00
By the Trustees, General and Special Funds . . . . .	207,435.85
Grand Total . . . . .	\$393,192.85

For the coming year the two African expeditions at present in the field will be continued, the one under Mr. Carl Akeley in British East Africa

and the other under Messrs. Lang and Chapin in the Congo; also the Stefánsson-Anderson Expedition along the Arctic borders of British America will be maintained. New expeditions are projected in the West Indies, in Colombia and Venezuela. Another whaling expedition will be sent to the coast of Japan in November. Altogether \$62,906.63 has already been subscribed or pledged toward the exploration work of the Museum during the coming year in various parts of the world.

### EXPEDITION TO LOWER CALIFORNIA

THROUGH a fortunate coöperation between the American Museum of Natural History and the United States Bureau of Fisheries, the large government steamer *Albatross* sailed from San Diego, February 25, on a two months' collecting expedition to Lower California. Dr. Charles H. Townsend, Acting Director of the Museum, is in command of the expedition. He is well acquainted with the region, having previously made several zoölogical and fishery trips in this part of the Pacific; also he knows well the work of the steamer *Albatross* since he was the naturalist of the vessel on several voyages, and even participated in this vessel's deep-sea investigations under the late Professor Agassiz.

Dr. Townsend is accompanied by seven investigators and collectors, certain of them representing the United States National Museum at Washington, the New York Zoölogical Society and the New York Botanical Gardens all of which bear a share of the burden of the expense of the trip and participate in the collecting.

Dr. Townsend will begin the work with a line of deep-sea dredgings to Guadalupe Island some two hundred and fifty miles from San Diego. The dredging will extend even to depths of two and one-half miles. Mr. G. C. Bell of the preparation department of the American Museum is a member of the staff of the expedition and will make molds of the various deep-sea fishes and invertebrates as soon as they are collected. Deep-sea species have previously been known by the public only in the form of unattractive alcoholic material and if successful plaster and glue molds can be obtained and lifelike casts made, the triumph will be great for the preparator's skill and a work will be done that has never before been attempted.

From Guadalupe Island the *Albatross* will work eastward to begin a fishery survey of the Peninsula of Lower California. The fishery resources of the region will be studied with a view to the establishment of closer fishery relations with Mexico, and if possible, to opening the way for fishery trade and the utilization of the important fish and oyster resources in our

southwestern states. It may even be possible that the pearl shell from an important pearl shell industry of this region can be transplanted to Florida.

There will be work on shore also. The Peninsula is seven hundred and fifty miles long and will be studied along both coasts. During the progress of the vessel along these coasts collecting parties will be landed each day to procure the mammals, birds, reptiles and fishes of the region, which are of especial interest to naturalists because so large a number of them are peculiar to the locality. Altogether, it is expected that the work of the expedition will bring large results along fishery, oceanographic and biological lines.

### MUSEUM NEWS NOTES

SINCE our last issue the following persons have been elected to membership in the Museum:

*Benefactors*, MR. J. PIERPONT MORGAN and MRS. MORRIS K. JESUP;

*Patrons*, MR. ANDREW CARNEGIE and MRS. EDWARD H. HARRIMAN;

*Life Members*, MESSRS. WILLIAM GOULD BROKAW, F. AMBROSE CLARK, MICHAEL JENKINS, JOHN ROGERS, PHILIP A. ROLLINS, WALTER WINANS, MRS. MARIAN VON R. PHELPS, MISS FRANCES VON R. PHELPS and MASTER PHELPS VON R. PHELPS;

*Sustaining Member*, MISS SUSAN D. GRIFFITH;

*Annual Members*, MESSRS. E. B. CROWELL, GHERARDI DAVIS, J. WILLIAM GREENWOOD, TOWNSEND JONES, T. W. LAMONT, NICOLL LUDLOW, FRANK J. MUHLFELD, JOSEPH H. SPAFFORD, EDWARD W. SPARROW, EDWARDS SPENCER, CHARLES H. WERNER, DR. CHARLES REMSEN and ARTHUR L. HOLLAND, MMES. THEO. B. BLEECKER, CHARLES S. FAIRCHILD, RUSSELL WELLMAN MOORE and PAYNE WHITNEY.

DR. J. A. ALLEN was appointed Acting Director pro tem at a Special Meeting of the Executive Committee, February 20, 1911, for the period of Dr. Townsend's absence on the Albatross expedition to Lower California.

IN its meeting of January 18, 1911, the Executive Committee of the Board of Trustees approved the following Appointive Committee on Public Health named by President Osborn: Dr. Simon Flexner, Mr. John M. Glenn, Mr. J. Waldo Smith.

THE following persons have contributed to the South American Bird Fund and have been made Life Members of the Museum in recognition of their gifts: Messrs. George B. Case, Evans M. Evans, W. F. Patterson, George P. Shiras and F. C. Walcott.

At the Special Meeting of the Executive Committee on February 20, 1911, Mr. John A. Grossbeck was appointed Assistant in Invertebrate Zoölogy.

MR. ALBERT OPERTI, official artist of the Peary Expeditions of 1896 and 1897, has presented to the Museum twenty-four sketches in oil, showing the excavation of the great meteorite "Ahnighito" and its transfer to the ship ready for the journey to New York.

THE MUSEUM is indebted to Mr. Walter Winans for the gift of a series of wild boar including adults and young of both sexes, collected with a view to their use in the construction of a habitat group. He has also sent us two fine specimens of the European red deer. All of these specimens were taken in the Sachsenwald, Friedrichsruhe, Germany. These specimens are the first good examples of the species that the Museum has received.

A CLUB ROOM FOR MEMBERS was opened on February 28. This room situated on the third floor near the elevators is one of the most attractive in the building and has been furnished to serve as far as may be the comfort of the Museum's patrons. A formal presentation of the portrait of the Honorable Joseph H. Choate, painted by the Princess Lwoff-Parlaghy and presented to the Museum by the artist, was made the occasion of the opening and of an informal reception. The other portraits owned by the Museum hang in this room also at present, awaiting the time when the extension of the Museum building will allow a Portrait Hall especially designed and lighted where can be told the history of the Museum as shown in its founders and benefactors.

MISS MARY LOIS KISSELL has just returned from a four months' trip to the Pima Indians of southern Arizona and brings with her a basketry collection in which are several artistic "carrying baskets" woven with dyed thread made of maguey fiber and six "medicine baskets" of Papago make. The latter are rare in collections because of the great difficulty that exists in obtaining them.

MRS. R. O. STEBBINS has recently presented to the Museum the collection made by the late Dr. R. O. Stebbins of the Arctic Club of America. The gift is largely ethnological, comprising Eskimo, Javanese, Chinese and Plains Indians material, but includes also a collection of minerals as well as specimens of mammals and invertebrates.

THE membership of the Museum for the year 1910 shows a net increase of ninety-three over that of the preceding year.

PUBLIC meetings of the New York Academy of Sciences and its Affiliated Societies will be held at the Museum according to the usual schedule. Programmes of meetings are published in the weekly *Bulletin* of the Academy.

## LECTURE ANNOUNCEMENTS

### MEMBERS' COURSE

The following lectures illustrated by stereopticon will be given during March to Members of the Museum and persons holding complimentary tickets given them by Members.

Thursday evenings at 8:15 o'clock. Doors open at 7:45.

March 2 — MR. D. E. GRÜBL, "Tibet and the Himalayas."

Mr. Grühl will present the history of Buddhism in Tibet and the hierarchy of the Dalai Lama. He will describe the life and ceremonies of the people and explain the significance of the recent political changes in the Dalai Lama's realm. Mr. Grühl obtained during his travels some splendid pictures of the Himalayas and the borderlands of Tibet.

March 9 — MR. FREDERICK C. HICKS, "Glimpses of the Far East."

During a trip of about 30,000 miles, Mr. Hicks procured much interesting and instructive data on conditions in the Orient, as well as many photographs of the points visited. In his lecture he will speak of Korea, of China and its Great Wall and of the vast country traversed by the Siberian Railway.

March 16 — MR. CLAUDE N. BENNETT, "The Panama Canal — The Eighth Wonder of the World."

Mr. Bennett is the founder and manager of the Congressional Information Bureau at Washington. He has recently spent a month in the Canal Zone and made a thorough study of the Canal and the surrounding country. His lantern slides and moving pictures cover the work which has been accomplished to the present time.

March 23 — MR. DOUGLAS WILSON JOHNSON, "Physical History of the Grand Cañon District."

*Given in cooperation with the American Scenic and Historic Preservation Society*

Mr. Johnson's lecture deals with the principal events in the physical history of that portion of the Colorado plateau province lying in northern Arizona and southern Utah. Especial attention is given to the effects of the physical history upon the scenery of the district. Most of Mr. Johnson's lantern slides are of points not commonly visited by tourists.

March 30 — MR. ROY C. ANDREWS, "From Japan to the Dutch East Indies."

In November Mr. Andrews returned from a fifteen month's absence during which, on board the United States ship Albatross, he visited Japan, Formosa and many of the islands of the Dutch East Indies. He will illustrate his lecture with a very complete series of lantern slides.

### PUPILS' COURSE

These lectures are open to the pupils of the public schools when accompanied by their teachers and to children of Members of the Museum on presentation of Membership tickets.

Mondays, Wednesdays and Fridays at 4 o'clock.

March 20 and April 17 — MR. ROY W. MINER, "Early Days in New York."

March 22 and April 19 — MR. ROY C. ANDREWS, "A Visit to the Orient."

March 24 and April 21 — DR. LOUIS HUSSAKOF, "Scenes from Pole to Pole."

March 27 and April 24 — MR. JOHN T. NICHOLS, "Natural Resources of the United States."

March 29 and April 26 — MR. WALTER GRANGER, "Famous Rivers of the World."

March 31 and April 28 — MR. HARLAN I. SMITH, "Life among Our Indians."

April 3 and May 1 — MR. ROY C. ANDREWS, "Travels and Life among the Japanese."

April 5 and May 3 — DR. LOUIS HUSSAKOF, "South American Scenes."

April 21 and May 5 — MRS. AGNES L. ROESLER, "Around the World with Children."

### PEOPLE'S COURSE

*Given in coöperation with the City Department of Education*

Tuesday evenings at 8:15 o'clock. Doors open at 7:15.

The first four of a course of eight lectures on music by MR. DANIEL GREGORY MASON. Illustrated at the piano.

March 7 — "Edvard Grieg."

March 14 — "Antonin Dvořák."

March 21 — "Camille Saint-Saëns."

March 28 — "César Franck."

Saturday evenings at 8:15 o'clock. Doors open at 7:15.

The first four of a course of six lectures by MR. ALBERT HALE. Illustrated.

March 4 — "The East Coast of South America: Brazil, Uruguay and the Argentine Republic, from the Amazon River to the Rio de la Plata."

March 11 — "The West Coast of South America: Chili, Bolivia, Peru and Ecuador. The Andes and the Incas."

March 18 — "The Caribbean Sea: Venezuela, Colombia and Panama. The Mountain Tropics and the Isthmian Canal."

March 25 — "The Island Republics of the Gulf: Cuba, Haiti and Santo Domingo. The early Discoveries of Columbus."

### JESUP LECTURES

*Given under the auspices of Columbia University in coöperation with the Museum*

The last five of a course of eight lectures on "Scientific Features of Modern Medicine" by FREDERIC S. LEE, PH.D., Professor of Physiology in Columbia University. These lectures are open to the public.

Wednesday evenings at 8:15 o'clock.

March 1 — "Bacteria and Their Relation to Disease."

March 8 — "The Treatment and the Prevention of Infectious Diseases."

March 15 — "The Problem of Cancer and Other Problems."

March 22 — "Features of Modern Surgery."

March 29 — "The Rôle of Experiment in Medicine. The Public and the Medical Profession."



# Scientific Staff

## ACTING DIRECTOR

CHARLES H. TOWNSEND, Sc.D.

## GEOLOGY AND INVERTEBRATE PALEONTOLOGY

EDMUND OTIS HOVEY, A.B., Ph.D., Curator

## MINERALOGY

L. P. GRATACAP, Ph.B., A.B., A.M., Curator

GEORGE F. KUNZ, A.M., Ph.D., Honorary Curator of Gems

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FRANK E. LUTZ, A.B., A.M., Ph.D., Assistant Curator

L. P. GRATACAP, Ph.B., A.B., A.M., Curator of Mollusca

WILLIAM BEUTENMÜLLER, Associate Curator of Lepidoptera

JOHN A. GROSSBECK, Assistant

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CHARLES W. LENG, Ph.D., Honorary Curator of Coleoptera

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LOUIS HUSSAKOF, B.S., Ph.D., Associate Curator of Fossil Fishes

JOHN T. NICHOLS, A.B., Assistant Curator of Recent Fishes

MARY CYNTHIA DICKERSON, B.S., Assistant Curator of Herpetology

## MAMMALOGY AND ORNITHOLOGY

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FRANK M. CHAPMAN, Curator of Ornithology

ROY C. ANDREWS, A.B., Assistant Curator of Mammalogy

W. DE W. MILLER, Assistant Curator of Ornithology

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W. D. MATTHEW, Ph.B., A.B., A.M., Ph.D., Curator

WALTER GRANGER, Associate Curator of Fossil Mammals

BARNUM BROWN, A.B., Associate Curator of Fossil Reptiles

WILLIAM K. GREGORY, A.B., A.M., Ph.D., Assistant

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HARLAN I. SMITH, Associate Curator

ROBERT H. LOWIE, A.B., Ph.D., Assistant Curator

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ALANSON SKINNER, Assistant

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Prof. CHARLES-EDWARD AMORY WINSLOW, S.B., M.S., Curator

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# THE AMERICAN MUSEUM JOURNAL



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# The American Museum Journal

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MARY CYNTHIA DICKERSON, *Editor*

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## SCIENTIFIC PUBLICATIONS, 1910

### The American Museum of Natural History

The scientific publications of the American Museum are issued in three series:

The *Bulletin* in which are published short articles embodying the results of the research work of the various departments of the Museum. These articles are less voluminous and of more general interest than those which appear in the *Memoirs*. The *Bulletin* was founded in 1881, and the number of volumes which have been issued is twenty-eight;

The *Memoirs* composed of special articles covering research requiring more exhaustive treatment. They have been published at irregular intervals since 1893. Ten complete volumes and parts of four others have been issued;

The *Anthropological Papers*, similar in character to the *Bulletin*, but devoted exclusively to the results of field work and other research conducted by the anthropological staff of the Museum. The publication of these papers was commenced in 1907, six volumes having been issued up to the present time.

The scientific publications for the year 1910 are as follows:

#### BULLETINS AND MEMOIRS

J. A. ALLEN, Editor

*Bulletin* XXVII The Orders of Mammals. By William K. Gregory. pp. <sup>5</sup>/<sub>2</sub>1-525, 32 text figures.

*Bulletin* XXVIII (Twenty-nine plates and 100 text figures)

Art. I — The Black Bear of Labrador. By J. A. Allen. pp. 1-6.

II — Mammals from the Athabaska-Mackenzie Region of Canada. By J. A. Allen. pp. 7-11.

III — Mammals from Palawan Island, Philippine Islands. By J. A. Allen. pp. 13-17.

IV — Description of a Skull and some Vertebrae of the Fossil Cetacean *Diochotichus vanbenedeni* from Santa Cruz, Patagonia. By Frederick W. True. pp. 19-32, pls. i-v.

V — On the Skull of *Apternodus* and the Skeleton of a New Artiodactyl. By W. D. Matthew. pp. 33-42, pl. vi, 5 text figs.

VI — On the Osteology and Relationships of *Paramys*, and the Affinities of the Ischyromyidae. By W. D. Matthew. pp. 43-72, 19 text figs.

VII — On some Orthoptera from Porto Rico, Culebra and Vieques Islands. By James A. G. Rehn. pp. 73-77, 1 text fig.

VIII — Some Parasitic Hymenoptera from Vera Cruz, Mexico. By Charles T. Brues. pp. 79-85, 1 text fig.

IX — Additional Mammals from Nicaragua. By J. A. Allen. pp. 87-115.

- X — The North American Species of *Neuroterus* and their Galls. By William Beutenmüller. pp. 117-136, pls. viii-xiii.
- XI — The North American Species of *Aglax* and their Galls. By William Beutenmüller. pp. 137-144, pl. xiv.
- XII — Mammals from the Caura District of Venezuela, with Description of a New Species of *Chrolopterus*. By J. A. Allen. pp. 145-149.
- XIII — On the Genus *Presbytis* Esch., and 'Le Tarsier' Buffon, with Descriptions of Two New Species of *Tarsius*. By D. G. Elliot. pp. 151-154.
- XIV — A Note on *Siphostoma pelagicum* (Osbeck). By John Treadwell Nichols. pp. 155-157, 1 text fig.
- XV — A Note on the Identity of *Caranx forsteri* Cuvier and Valenciennes. By John Treadwell Nichols. p. 159.
- XVI — On Two New Blennys from Florida. By John Treadwell Nichols. p. 161.
- XVII — New or Little Known Reptiles and Amphibians from the Permian (?) of Texas. By E. C. Case, pp. 163-181, 10 text figs.
- XVIII — The Skeleton of *Pacilospondylus francisi*, a New Genus and Species of Pelycosauria. By E. C. Case. pp. 183-188, 3 text figs.
- XIX — Description of a Skeleton of *Dimetrodon incisurus* Cope. By E. C. Case. pp. 189-196, pls. xv-xix, 5 text figs.
- XX — A Comparison of the Permian Reptiles of North America with those of South Africa. By R. Broom. pp. 197-234, 20 text figs.
- XXI — Tertiary Faunal Horizons in the Wind River Basin, Wyoming, with Descriptions of New Eocene Mammals. By Walter Granger. pp. 235-252, pls. xx-xxiii, 6 text figs.
- XXII — The North American Species of *Aulacidea* and their Galls. By William Beutenmüller. pp. 253-258, pls. xxiv-xxvi.
- XXIII — Three New Genera of Myrmicine Ants from Tropical America. By William Morton Wheeler. pp. 259-265, 3 text figs.
- XXIV — The Cretaceous Ojo Alamo Beds of New Mexico with Description of the New Dinosaur Genus *Kritosaurus*. By Barnum Brown. pp. 267-274, pls. xxvii-xxix, 7 text figs.
- XXV — Fossil Insects and a Crustacean from Florissant, Colorado. By T. D. A. Cockerell. pp. 275-288, 4 text figs.
- XXVI — The Phylogeny of the Felidae. By W. D. Matthew. pp. 289-316, 15 text figs.
- XXVII — Collation of Brisson's Genera of Birds with those of Linnaeus. By J. A. Allen. pp. 317-335.
- XXVIII — Observations on the Habits and Distribution of Certain Fishes taken on the Coast of North Carolina. By Russell J. Coles, pp. 337-348.

*Memoir XII (Jesup North Pacific Expedition, Vol. VIII)*

Part I — Chukechee Mythology. By Waldemar Bogoras. pp. 1-197.

*Memoir XIII (Jesup North Pacific Expedition, Vol. IX)*

Part I — The Yukaghir and the Yukaghirized Tungus. By Waldemar Joehelson. pp. 1-133, pls. i-vii, 1 map

## ANTHROPOLOGICAL PAPERS

CLARK WISSLER, Editor

Vol. IV. Part II — Notes Concerning New Collections. (Edited by Robert H. Lowie.) pp. 271-337, pls. iv-viii, 42 text figs.

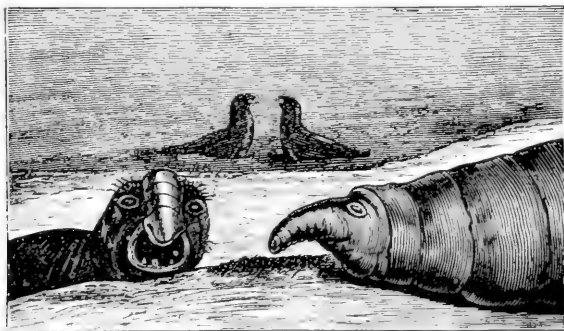
Vol. V. Part I — The Material Culture of the Blackfoot Indians. By Clark Wissler. pp. 1-176, pls. i-viii, 103 text figs.

Part II — Contribution to the Anthropology of Central and Smith Sound Eskimo. By Aleš Hrdlička. pp. 177-280, pls. xi-xxiii.

Vol. VI. Part I — The Archaeology of the Yakima Valley. By Harlan I. Smith. pp. 1-171, pls. i-xvi, 129 text figs.

Part II — The Prehistoric Ethnology of a Kentucky Site. By Harlan I. Smith. pp. 173-241, pls. xvii-lxiv, 1 text fig.

Other publications issued by the Museum are the *American Museum Journal* and the *Guide Leaflets*. All the above publications with the exception of the *Memoirs*, vols. VIII to XIV inclusive may be purchased from the Librarian of the Museum. Vols. VIII to XIV of the *Memoirs* are published by E. J. Brill, Leiden, Holland, and may be obtained through G. E. Stechert, Bookseller, 129 West 20th Street, New York City.



After Peron et Lescur. Paris, 1807

"SEA ELEPHANTS"

Comparison of this cut with the reproductions of photographs on pages 110 and 111 suggests something of the advance in accuracy zoological illustrative work has made in the past one hundred years



# The American Museum Journal

VOL. XI

APRIL, 1911

No. 4.

## RARE ELEPHANT SEALS FOR THE MUSEUM

REMINDERS OF AN EXTINCT MULTITUDE, A LOST INDUSTRY AND A LOST WEALTH  
WHICH ARGUE FOR ADOPTION OF THE PRINCIPLE OF CONSERVATION

ON February 25 the Government steamer Albatross carrying an expedition commanded by Dr. Charles H. Townsend sailed from San Diego for work in deep sea dredging and for a scientific investigation of Guadalupe Island, which lies some two hundred and fifty miles off the coast south of San Diego. On March 6 the vessel was again in port at San Diego to send to the East news of the expedition's success, and certain valuable freight, as told in the following extract from Dr. Townsend's letter:

Our success at Guadalupe Island was quite beyond expectation. In addition to work on the birds and plants and various land collections of the island, we captured alive six sea elephants for the New York Aquarium and the Zoölogical Park and succeeded in getting four skins and two skeletons of adult sea elephants for the American Museum.

The three old males were monsters sixteen feet long, with proboscis as long as the head. We have one skull two feet long. We wound up the young seals in nets so tightly that we could handle them like bales. The skins of the old bulls were very heavy; each one flensed and salted was packed in a full-sized barrel which it completely fills and that without the skull.

When all was packed and ready, then the work really began, for we had to get our loads through a heavy surf to the ship. A single specimen made a load and the ship lay more than a mile away. We had four "upsets" but lost nothing. The series of photographs which we obtained are the only ones of the species in existence, and there are none published of the Antarctic species that show large males.

The ship is taking on coal and we are off to-morrow [to Cedros Island]. We came back only on account of the six young sea elephants. The six cases of live seals go by express; the seven barrels of skins and skeletons we are sending by freight.

The elephant seal is a "true" seal (*Phocidæ*), although in breeding habits and in the fact that the males greatly exceed the females in size, it resembles the sea lion and the fur seal as well as the walrus. There are two species, a southern (*Macrorhinus leoninus*) not found north of 35° south latitude and a northern (*M. angustirostris*) not found south of 24° north latitude. The two forms differ little in habits or in external features, the classification being based on skull structure. The long isolation of the northern and southern forms would make them valuable for the study of



*Photograph by C. H. Townsend*

ELEPHANT SEALS OR "SEA ELEPHANTS" ON GUADALUPE ISLAND (ADULT MALES)

Largest of all Pinnipeds, not excepting the walrus; maximum length of male 22 feet, female much smaller (as among eared seals). or "trunk" has the nostril openings at the end and can be expanded and erected at will. Females and immature seals lack a proboscis



*Photograph by C. H. Townsend.*

With proboscis erected, and mouth opened, revealing formidable teeth, the sea elephant sends forth guttural roars which carry for a considerable distance



*Photograph by C. H. Townsend*

The male sea elephants fight desperately — “beach-masters” the sealers in the Antarctic called them — and their necks and breasts bear evidence of many encounters

geographical distribution and its effects on species formation, if sufficient material could be brought together for the work; but sea elephants were nearly exterminated before exhaustive museum collections were made, so that specimens are now rare. The American Museum prior to 1911 had in its relatively large collection representative of the seals no single example of this species, but at just this time when word of the new material comes from the Pacific, the institution has gained possession of two skulls from Kerguelen Island in the Antarctic.<sup>1</sup>

No better instance than the elephant seal can be given of the extermination of a species through the wastefulness and commercial greed of man, making clear the necessity of conservation as a principle directing human action. The elephant seal, unlike the fur seal, has a deep layer of blubber, sometimes six or seven inches thick, and the oil is superior even to whale oil. Elephant seals existed in vast numbers one hundred or more years ago and might still have been yielding a profitable industry. One has only to read the vivid descriptions by Captain Scammon, 1874, and by H. N. Moseley, Member of the Scientific Staff of the Challenger, 1879, to realize that here existed great wealth. Captain Scammon says of Heard's Island, "There were remains of thousands of skeletons. Bones lay in curved lines like long tide lines on either side of the plain above the beaches marking the rookeries of old time and tracks of the slaughter of the sealers."

The case is only several stages advanced beyond that of the fur seal. With the latter there is still the chance to handle the herds in a restricted industry and thus husband them until they can yield a larger industry without fear of loss of the species. Such must be in future the order for all industries dependent on wild animal life. For man has upon him at last the responsibility of knowledge, not only of the limitations of that life but also of the relative rapidity with which a species succumbs. By conservation, the era of strict economy in this line, as in others, will be delayed for coming generations, if not averted. Some species now approaching extinction can be restored through legislative protection and artificial breeding, some not yet endangered can be transplanted from continent to continent and domesticated; but no conservation is likely ever to make up for losses which have come through the actual extermination of whole races of animals of economic value. The elephant seal is only one of the many examples of extinct or nearly extinct fur-bearing or oil-producing animals or those of high food value, but it stands recorded in the world's history a scathing comment on the status of man's knowledge and of the development of his ethical sense in the nineteenth century.

M. C. D.

<sup>1</sup> Through the efforts of Mr. Frank K. Wood of New Bedford, Massachusetts.

## THE GROUND SLOTH GROUP

*By W. D. Matthew*

N EARLY two centuries ago a Spanish colonist in the Viceroyalty of Buenos Aires, now the Argentine Republic, discovered the skeleton of a huge animal *muy corpulente y raro* in the River Luján, a few miles from the city. The skeleton was sent to Madrid, where it was finally mounted and is still preserved in the Royal Museum.

This was the first fossil skeleton ever mounted. It was recognized by the finder as unlike that of any animal of his acquaintance. But it was the great Cuvier who recognized its relationship to the tree sloths and other animals of the Edentate order, and named it the *Megatherium*. Subsequently, in 1833, Charles Darwin on his voyage in the Beagle, visited the Argentine coasts and brought away various remains of this and other extinct animals, and between 1845 and 1860 several more or less complete skeletons of the *Megatherium* and other huge "ground sloths," as they came to be called, were sent to England and were studied and described by the great anatomist Richard Owen.

Since that time numerous fine skeletons of these animals have been disinterred from the vast loess or loam deposit which underlies the Pampas of the Argentine and is known as the Pampean formation. They are preserved in various European and American museums, and a splendid series of them is the pride of the two great museums of Argentina, the Museo Nacional and Museo de La Plata.

A fine collection of these and other extinct mammals of South America, made by Señors Ameghino, Larroque and Brachet, was exhibited at the Paris Exposition of 1878 and passed into the possession of the late Professor Cope. It was purchased for the American Museum in 1900 by a



THE GROUND SLOTH GROUP

This group was completed in February, 1911, and installed in the new Quaternary Hall of the American Museum

number of the Trustees of this Museum, and its principal specimens are or will be exhibited in the South American section of the new Quaternary Hall.

The center-piece of this exhibit is the new Ground Sloth Group, just completed. It consists of four original skeletons representing two genera of these animals, *Lestodon* and *Mylodon*. The largest skeleton, *Lestodon armatus*, ranks next to the *Megatherium* in size, but differs in various particulars, especially in the shape of the head, characters of the teeth and number of claws on the feet. The three smaller skeletons belong to two species of *Mylodon*, *M. robustus* and *M. (Pseudolestodon) myloides*.

The skeletons are grouped around a tree trunk, in poses indicating the supposed habits and adaptation of the living animals. The *Lestodon*, standing on his hind legs, is endeavoring to reach up and drag down branches of the tree. One of the *Mylodons* is busily digging and tearing at the roots to loosen and break them and so help his big friend to uproot and pull the tree down. A third animal is coming around the base of the tree to assist in the digging operations, while a fourth stands at a short distance, ready to add his weight to drag down the branches when they are brought within reach.

These poses illustrate the theory of the habits of the ground sloth deduced by Owen from the study of the skeletons—a model of scientific reasoning whose accuracy has never been impugned. Among the earlier students of this animal, the cautious Cuvier had contented himself with observing that the great clawed feet indicated that it was more or less given to digging in the ground. Some of his learned contemporaries were bolder in their speculations. Pander and D'Alton regarded it as an “enormous earth-mole which obtained its nourishment beneath the earth's surface through continuous exertion of its colossal strength; and when, perhaps by sinking of the ground to the sea-level, it was driven to live on the surface of the earth, its vast powers, lacking exercise, degenerated, and its size dwindled, until finally it became the weak and puny tree sloth of to-day.”<sup>1</sup>

Lund at a somewhat later period, held a view scarcely less fanciful. He believed that the *Megatherium* was arboreal, like the modern sloth, and observes: “In truth, what ideas must we form of a scale of creation where instead of our squirrels, creatures of the size and bulk of the Rhinoceros and Hippopotamus climbed up trees. It is very certain that the forests in which these huge monsters gambolled could not be such as now clothe the Brazilian mountains, but it will be remembered . . . that the trees we now see in this region are but the dwarfish descendants of loftier and nobler forests . . . and we may be permitted to suppose that the

<sup>1</sup> Translated and condensed from Pander and D'Alton's *Das Riesen Faul-Thier*, 1821, p. 16.







*By courtesy of the New York Zoological Society*

THE MODERN TREE SLOTH

This is the nearest living relative of the ground sloths

vegetation of that primeval age was on a no less gigantic scale than the animal creation."<sup>1</sup>

Owen very properly ridiculed these fanciful theories. In point of fact, the mere size of the animal would render either of these modes of life impossible so long as the laws of physics and mechanics hold true. The mode of life which is practicable to a mole or a squirrel is an utter physical

<sup>1</sup> Translated in Owen 1842, "Description of the Skeleton of an Extinct Gigantic Sloth."

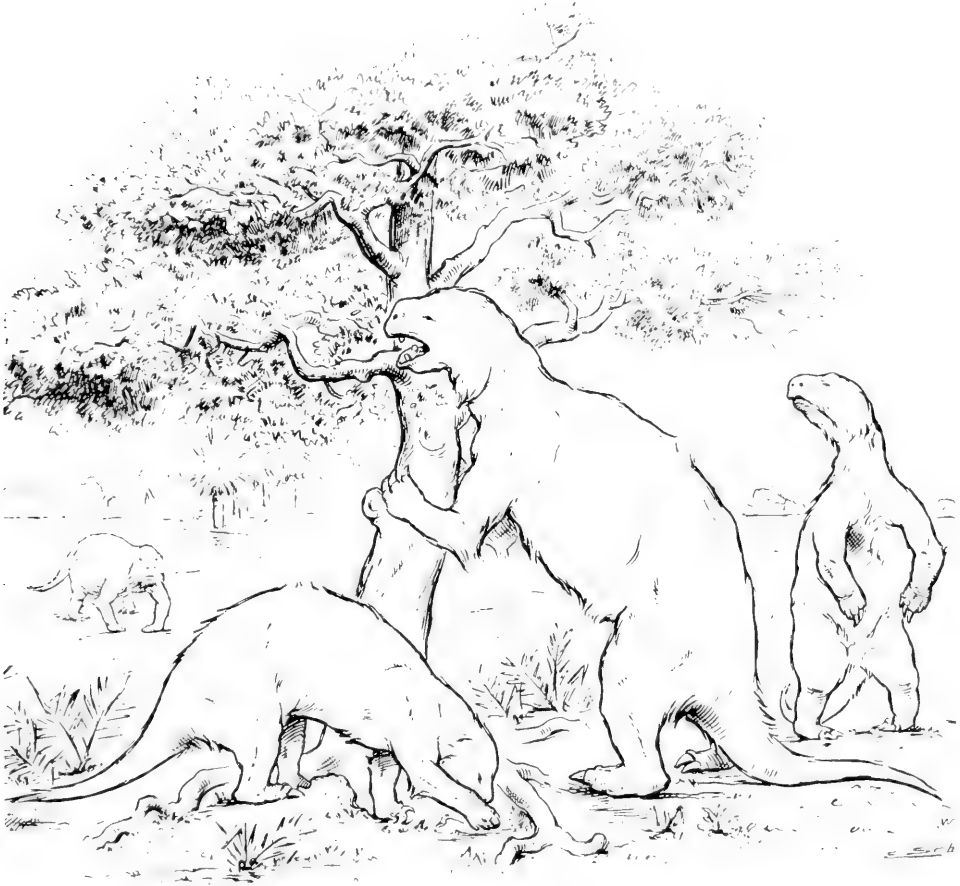
impossibility to an animal the size of the *Megatherium*. It could not have been other than terrestrial or aquatic, and of the latter mode of life there is no indication in its structure.

In his brilliant and masterly argument the great English anatomist showed how the teeth were adapted to the bruising and crushing of leaves and twigs, how the structure of the jaws and skull and arrangement of the nerve channels indicated loose, flexible lips and long prehensile tongue adapted to browsing; how the long loose-jointed forelimbs would enable it to lay hold of branches or small trees and drag them down within reach; how the powerful claws would enable it to dig around the roots of larger trees and loosen them, and the massive hind quarters and tail would give the necessary weight and fulcrum to pull down these trees when loosened in order to feed upon the upper foliage thus brought within its reach. In incidental support of this theory, he pointed to the frequent occurrence of fractures in the massive, heavy bones of limbs and skull. One of the skeletons in this group has a naturally healed fracture of the bones of the hind leg very likely due to a tree falling upon it in the course of its lumbering operations — lumbering, perhaps, in more senses than one.

Such is the theory of the habits of life of the ground sloths, which this group is designed to illustrate. As to their appearance, we know from recent discoveries that the *Mylodons* were covered with a thick coat of furry hair, somewhat like the brown bears of Alaska. A large piece of the hide found in a cavern at Last Hope Inlet, Patagonia, is preserved in the British Museum. It is of a golden brown color, and the thick skin, in which are buried numerous small nodules of bone, made an effective defense against cold, the assaults of nearly all beasts of prey, and most of the bumps and bruises incidental to its mode of life. The one carnivorous enemy the *Mylodon* might have cause to fear would be the great sabre-tooth tiger, *Smilodon*, whose huge compressed canine tusks and powerful organization were adapted to prey upon the great thick-skinned ground sloths and other large herbivora.

The Ground Sloth Group is the most realistic that has yet been attempted in the mounting of fossil skeletons, and the method of mounting, eliminating the upright steel rods ordinarily used, adds much to its effectiveness. This method, devised in 1904 by Albert Thomson of this department, is here applied for the first time by Head Preparator Hermann to the mounting of large skeletons. The group was designed by Erwin Christman and a small working model made. The parts of the skeleton in the model are easily adjustable, and the poses were criticised and discussed in comparison with the unmounted skeletons by Professor Osborn and the scientific staff until an adjustment was reached which seemed to represent the most

characteristic poses and the habits of these animals. The original skeletons were then mounted by Charles Lang under direction of Mr. Hermann, their missing bones and processes having first been restored by Charles and Otto Falkenbach.



SKETCH RESTORATION OF THE GROUND SLOTH GROUP BY ERWIN CHRISTMAN. 1911



*Photo by Dwight Franklin*

One may seize a five-foot paddlefish by the "nose" or the tail and haul it into the boat



*Photo by Dwight Franklin*

THE DAY'S CATCH

## THE SPOONBILL FISHERY OF THE LOWER MISSISSIPPI

*By Louis Hussakof*

LAST spring the Museum sent an expedition to the State of Mississippi to collect material for an exhibition group of the paddlefish or spoonbill-cat. This is one of the most singular fishes found in American waters. The name paddlefish is given it in allusion to the extraordinary, long, paddle-shaped jaw or "nose." It is a large fish, often reaching a length of six feet and a weight of one hundred and sixty pounds. It is found only in the water-ways of the Mississippi valley, ranging as far north as the Great Lakes.

From the name spoonbill-cat by which it is often known, one might think it a catfish; but it is not a catfish. It is a ganoid, or a member of that ancient group of fishes which includes the sturgeon and a few other

forms. In earlier geologic times ganoids were the dominant race of fish, at one period of their evolution even outnumbering all the other kinds of fish put together. But they have since then fallen upon evil times, and are now reduced to only a few genera, which play but an insignificant rôle in the fish-life of to-day.

The paddlefish reaches its largest size and is found in greatest abundance in the smaller lakes connected with the lower Mississippi; and it was at one of these lakes — Moon Lake, in Coahoma County, Mississippi — that material was sought. Here Mr. I. E. McGehee carries on an extensive spoonbill fishery, and through his courtesy, admirable collecting facilities, including the use of his fishing paraphernalia, were obtained. The Museum party consisted of Mr. Dwight Franklin of the Department of Preparation of the Museum, and the writer; the expenses of the work were defrayed by the Dodge Fund.

Until about a decade ago the spoonbill was of little economic value; it was interesting merely as a zoölogical curiosity. About that time however, the fact was discovered that when smoked it makes a tolerable substitute for smoked sturgeon and that its roe makes excellent caviar. Since then spoonbill fisheries have sprung up at various points on the Mississippi and Ohio rivers.

The fish is usually taken in a seine. A practical method of operating a large seine has been introduced by Mr. McGehee at Moon Lake and is worth noting. The seine is wound on a huge spool-shaped reel which is mounted in a flat-bottomed boat. It is laid by unrolling this reel; and it is wound up by having the crew walk up the spokes of the wheels as on a ladder, so that the reel is made to revolve. As the seine is gradually wound up and the fish are confined to narrower and narrower space, they dart wildly about seeking means of escape. One may then study the paddlefish at close range. It is an exceedingly clumsy creature, hardly making an effort to escape capture. Its sense of sight is poorly developed, as indeed one might infer from its small beady black eyes. If its "nose" is caught in the seine it makes only feeble efforts to free itself, and usually fails in doing so. The contrast between the clumsiness of the spoonbill and the alertness of an active fish, is strikingly brought out if any garpike are in the haul; for the gar makes tremendous efforts to escape and unless rendered unconscious by a blow with a mallet, will flash through the seine as if it were gauze. Leaning over the side of the boat, near the cork-line of the seine, one may seize a five-foot paddlefish by the "nose" or the tail and haul it into the boat; the only resistance is that of weight. The fish has absolutely no sport value. The number of spoonbill taken in a single haul varies; sometimes only a few are brought up, and sometimes



*Photo by Dwight Franklin*

Seining for spoonbill on Moon Lake, Mississippi



*Photo by L. Hussakof*

The crew walk up the spokes of the wheels as on a ladder thus causing the reel to revolve and wind up the seine



*Photo by L. Hussakof*

Of course other fish are caught, such as bass, carp, crappie and drum; but they are of secondary importance and the game fish taken are thrown back

as many as a hundred. Of course other fish are caught, such as bass, carp, crappie, and drum; but they are of secondary importance and the game fish thus taken are thrown back as they are safeguarded for the angler by state law.

The paddlefish are cut up in the manner shown in the photograph. Their heads and fins are usually discarded, but sometimes they are boiled for their oil. The roe is then removed to be prepared into caviar. It



*Photo by L. Hussakof*

Removing the roe for the preparation of caviar. The roe weighs from two to fifteen or twenty pounds in a single fish. The heads and fins are usually discarded but sometimes they are boiled for their oil. The body of the fish is smoked and becomes "sturgeon"





*Photo by Dwight Franklin*

Preparing spoonbill caviar. The roe is put on a coarse wire sieve and rubbed by hand across the wires until the eggs are separated from their membranes and drop into the pan beneath

are separated from their membranes and drop into the pan beneath the sieve. The raw caviar is mixed with "German" salt and is ready for shipment. It must undergo still further preparation however, before it is in the form familiar to us. In its raw state it brings about half-a-dollar a pound. It is said that spoonbill caviar is the best known, having received the highest award at one of the World Expositions.

weighs from two to fifteen or twenty pounds, in a single fish. It is put on a coarse wire sieve and rubbed by hand across the wires until the eggs



*Photo by L. Hussakof*

The spoonbill or paddlefish (*Polyodon spathula*)

## RESEARCH AND EXPLORATION AMONG THE INDIANS OF THE NORTHERN PLAINS

*By Clark Wissler*

**D**URING the summer of 1910 the research staff of the Department of Anthropology made further progress on the systematic survey of the Northern Plains Tribes, returning collections from the Crow, Dakota and Village Indians. In central North America there is a large area drained by the Upper Missouri and Saskatchewan rivers, grass-covered land for the most part, the home of a number of Indian tribes of peculiar interest to anthropologists. Here in buffalo days lived eleven different tribes,—the Sarsi, Blackfoot, Gros Ventre, Assiniboiné, Crow, Dakota, Plains Cree, Plains Ojibwa, Hidatsa, Arikara and Mandan. Each occupied a more or less definite territory, and spoke a distinct language, generally recognized as belonging to one of four widely distributed linguistic families, Algonkin, Siouan, Athapasean and Caddoan. At present representatives of these aboriginal tribes survive on reservations in various parts of the area. The cultures of this group of northern Plains Indians, as presented in museum collections, show striking fundamental similarities in contrast to diverse linguistic origin and offer therefore an inviting field for museum collecting and investigation.

In 1906 the Department of Anthropology selected this area for continuous systematic exploration, to seek data for formulating the manner in which special ceremonies like the sun dance and the medicine pipe, as well as distinctive traits of material culture and art, were distributed throughout the region, one of the more important groups of problems now confronting serious students of American anthropology. Fortunately for this plan, the tribes concerned were neither closely confined nor forced to abandon their aboriginal economic life until after 1865, the change being gradual and continuous to the present day so that the domestic life and other aspects of culture, while much modified, are still cherished in the memories of old Indians from whom data and specimens may yet be obtained. Naturally with each succeeding year comes the obliteration of more and more of these precious memories, rendering the labors of our field workers less and less productive. The realization of this has led to the vigorous prosecution of the work by our field staff to the extent of available funds.

Field exploration has been conducted among practically the full list of tribes contemplated in the plan, the Sarsi, Blackfoot, Assiniboiné, Nez Perce, Northern Shoshone, Crow, Teton-Dakota, Hidatsa, Arikara, Mandan, Plains Cree and Plains Ojibwa. In most cases however, the work is still

far from complete and some important divisions of several tribes have not yet been visited. In every case more than a beginning has been made while in several instances the data accumulated are quite sufficient for the detailed study of the area necessary to the development of anthropology in America.

Regarding publications of results of this exploration, the following series has been issued: *Some Protective Designs of the Dakota, Gros Ventre Myths, Ethnology of the Gros Ventre, Mythology of the Blackfoot Indians, Mythology of the Northern Shoshone, Mythology of the Assiniboine, and Material Culture of the Blackfoot Indians*. In addition to these seven papers the following will appear in due time: *Social and Ceremonial Culture of the Blackfoot, Ethnology of the Crow, Ethnology of the Teton-Dakota, the Hidatsa and the Sarsi*. Other papers will appear as soon as the field work is sufficiently advanced. No other institution has given much attention to this area and while the older historical literature contains much valuable data of a desultory character, the only other specific publications not found in our series are a few minor studies on the Crow, Blackfoot, Hidatsa and Dakota, none of which are sufficiently comprehensive for a serious comparative study of the area as a whole. The field work has been conducted by the staff of the Department of Anthropology, Messrs. Clark Wissler, P. E. Goddard, Robert H. Lowie, Herbert J. Spinden and Alanson Skinner, also by Dr. J. R. Walker and Rev. Gilbert L. Wilson, not connected directly with the Museum.

Supplementary to this plan, Mr. Harlan I. Smith conceived and developed a plan for the archaeological survey of the Upper Missouri basin. The part of this area falling within the state limits of Wyoming and Montana is practically unknown to archaeology. Mr. Smith's explorations have so far been confined to eastern Wyoming, the results of which will be presented in a future publication. This work enjoying not only priority, but being conducted in a systematic manner will be an important contribution to our knowledge of the area and, it is hoped, will afford some basis for a conclusion as to the early inhabitants of the region, a matter of no small importance in the general comparative results of the ethnological survey now nearing completion.

Museum anthropology is confined to the aspects of culture represented by collections. Our collectors have met with favorable conditions so that their returns, supplemented by gifts from private collectors and patrons, give a fair start toward an efficient study series for the area as a whole. The Department has developed plans for an entire exhibition hall in which the general aspects of culture so far discovered in the area may be presented, showing with some detail the peculiarities in distribution for the distinctive traits.



*Mural panel by Will S. Taylor*

A TSIMSHIAN FAMILY MAKING EULACHON "BUTTER"

The glow of the ember fire is on the girl's face as she waits for stones to heat. In the box at the right, fish are being boiled by means of the heated stones: the oil thus removed from the fish forms "butter." The residue is being strained by the woman at the left. The artist has used the medium of steam here and in the "Canoe Builders" to distribute the color effect of the fire

## FOREWORD ON THE NEW MURAL PAINTINGS IN THE AMERICAN MUSEUM

THE first large commission for mural decoration in this country was given for Trinity Church, Boston. That was in 1870 and the artist was John La Farge, working in coöperation with H. H. Richardson, architect. Since that time and particularly in the past ten years there has been great advance in mural painting in America. Great public buildings are no longer built for utility only, but are given beauty and a character fitting their purpose by the coöperation of the artist with the architect. In a Museum, as a public building which entertains and educates the million or more people who visit it annually, there is opportunity for a high standard in the architecture and decoration of its halls, harmonizing design and color with the spirit as well as with the details of each accompanying exhibit. In this, mural decoration is fitted to play a large part, for the mural painting can often perform forcefully and with an effect of beauty what can be accomplished in no other way: it can vitalize an exhibit by setting forth the life and the country that the exhibit represents.

In the summer and fall of 1909 the American Museum sent an expedition to the North Pacific Coast, with Mr. Harlan I. Smith, ethnologist in charge, and Mr. Will S. Taylor, artist. On this expedition Mr. Taylor made studies for a series of mural panels to represent the North Pacific Indians as they were one hundred years ago when uninfluenced by white men. Sketches of landscapes were obtained, color notes on the different tribes and many photographs. Most of the old industries had disappeared however — as had also the old costumes — so that with all effort these mural paintings have had to be largely restorations. This has entailed tedious study of museum material and the literature of the subject on the part of the artist since his return. His study has been rewarded however; the ethnological staff of the Museum and Lieutenant Emmons, who has generously helped in the work of scientific supervision, pronounce these paintings rarely accurate presentations. Landscapes although idealized give the color and feeling of particular spots which a visitor to this northern country can locate, while each canvas shows good type portraits of the tribe represented.

The four panels from north to south in the Hall are in series, with color graded from the cool country of the northern part of the coast to the warmer country toward the south, and with design regulated in rhythmic sequence as in a mural frieze. The composition in each panel is simple and the action is readily understood. There is an evident center of interest and

the lines of the various figures, of mountain gorges, of masses of steam, of clouds, of tree branches either lead toward this center or serve to tie in the composition. Dignity appropriate to the subjects has been gained by a conspicuous introduction of vertical lines—a thin column of smoke, trees, totem poles, erect figures. Steam has been cleverly used in two of the pictures as a medium for the distribution of the color effect of fire.

Mr. Taylor considers himself fortunate in the position of the paintings in this Hall among old weathered totem poles, canoes and other symbols of Indian art. It has allowed him to portray the simple out-of-door life of the people with true local color and in a broadly decorative way unhampered by the usual modern architecture and ornament. The panels certainly meet the requirements of true decorations as well as serve their scientific purpose. They blend with their surroundings, an integral part of the color scheme of the Hall; they are flat in effect, clinging to the wall like tapestries though with relief high enough to give an effect of reality to the scenes and of increased space to the Hall.

The imagination sees also in these paintings something beyond the industry represented, something more than satisfying design and color. One finds himself picking out the various items that signify a development of love of beauty in this primitive race; speculating on the fact that the grandeur of this country has its concomitant in the earnestness of its people; and seeing in the pose and expression of certain of the figures evidence that mind and spirit, here as in all primitive races, have developed with the training of eye and hand. It is thus that Mr. Taylor's work done with high seriousness of aim meets the final demand of mural decoration.

M. C. D.

## THE NEW MURAL PAINTINGS AND THE INDUSTRIES THEY PORTRAY

*By E. C. B. Fassett*

THE first four of a series of mural decorations by Mr. Will S. Taylor are completed and in their places in the Hall of the North Pacific Coast Indians. They invest this Hall with atmosphere and local color. They hang like tapestries between the weathered totem poles and dealing with themes of industry, combine truthful illustration with landscapes that would seem to be purely ideal. Here are mountains forested with hemlock and cedar. Yonder are glimpses of blue glaciers and veils of mist that suggest the cool atmosphere of the northern summer. In Mr. Taylor's sea-girt, mountain-sheltered scenes we behold the homes of the

weavers, carvers, basket makers and canoe builders whose works are gathered together in this Hall of the North Pacific Coast peoples.

The arrangement of the Hall is planned in such a manner that the materials are divided into seven arbitrary groups representative of the various tribes from the Columbia River to Mount McKinley. The Tlingit materials from the coast of Alaska occupy a space near the northern end, one section illustrating the material industries, another the social affairs and ceremonials. The collection from the Haida people who occupy the country immediately south of the Tlingit, including the Queen Charlotte's Islands, follow and are arranged similarly. In like manner succeed the exhibits of the Tsimshian, Bella Coola, Kwakiutl, Nootka and the southern coast Salish peoples; while the new mural decorations are so placed that those opposite each exhibit represent the general characteristics of the country from which the Museum collections came.

#### THE FIRST PAINTING

##### *The Blanket Weavers*

The first of Mr. Taylor's series of mural paintings is placed on the west wall of the space occupied by the Tlingit collections. He has chosen for the subject of this decoration the rapidly disappearing art of the Chilkat blanket maker. The origin of this type of wool weaving is attributed to



As many as possible of the sketches were made in sunlight in order better to produce out-of-door effects when painting the decorations later



On the Stikine River at the Great Glacier. The artist visited all the country along the coast making color studies and collecting facts

the Tsimshian; but the art passed from them through the Tongas, the Stikine and the more southern Tlingit to the Chilkat tribe, a division of the Tlingit family which lives about the head of Lynn Canal in southeastern Alaska. This migration of art is attributable to the intermigratory habits of the people. Canoe life in the network of island channel-ways permits free intercourse between the tribes and an exchange of commodities which, together with the practice of intertribal marriages, accounts for the dissemination and perpetuation of similar arts among neighboring peoples.

The Chilkat blanket is undoubtedly the best possible expression for this group, not only that it is the emblem of the clan but also, as is always true of art objects, that it sums within its textile limits suggestions of the mythical lore and history of its people. Not least interesting is the fact that this textile is a copy from a painted design.

In the canvas against an impressive background of mountains, whose snows and glaciers are tinted with blues and purples and greens, a Chilkat blanket hangs in process of making, and around it is grouped the family engaged in the work. The man stands passively at the left. Carved emblems on the uprights of the looms, also the painted pattern board at the right of the composition, are his share in the work. The old woman seated at the right with lower lip distended by a mouth ornament indicative of her wealth and rank, is engaged in spinning a strand of the wool from the mountain goat.

For the weaving of a Chilkat blanket all the long coarse outer hair of the goat is discarded, since only the soft fine under wool is used. The wool is



spun by hand, and then dyed in the yarn. To prevent the hanging warp from tangling, it is divided and tied in bags of skin as indicated in the painting. The weaving is a marvel of patient execution with the unaided hand, in technique similar to one type of the basketry work of this tribe. The small color fields are woven separately and very ingeniously united by interweaving. Several of these small interwoven fields form divisions which are united with fine sinews, as thread is used by the European tapestry weavers. Technically the Chilkat blanket is a tapestry.

#### THE SECOND PAINTING

##### *The Canoe Builders*

The mural decoration on the west wall, next to that of the Tlingit, portrays the Haida Indians as woodworkers. They are engaged in canoe building just in front of a wooden structure which extends from the right of the composition. This structure is an example of the community house of these people. The timber is hand-hewn and skillfully joined. The boards of the walls are bevelled to slide in a groove and close up to one another with great nicety. Those important structural features, the corner posts and totem poles, the placing of which is the initial step of the building and the occasion of important ceremonies, are broadly indicated as befits their position in the composition.

The North Pacific Coast Indians are a fishing people. Their homes are largely among islands and Mr. Taylor could have chosen no better object illustrative of their lives than the canoe. It is their chief means of transportation and in it much of their lives is spent. The red cedars of Queen Charlotte's Islands produce logs from which are made huge canoes, sometimes from forty-five to sixty feet in length. The Haida are master craftsmen since there is no other type of dugout canoe so light, graceful and seaworthy as this one they construct.

In Haida canoe building, the outside contour is first hewn and carved. Wooden pins are driven through the outer surface to indicate the varying thickness of the walls of the canoe, and the interior is dug out to the depths thus fixed. The spread of the beam is attained by steaming the wood. The canoe is partly filled with water into which red hot stones are dropped producing steam which softens the wood. The sides are forced out by wedges which are afterward replaced by permanent seats. Beds of hot embers are kept near the canoes to dry the outer surface.

Not only is the Haida process of canoe building well suggested in this second painting, but also we get in this decoration the atmosphere of the



*Mural painted by Wil S. Taylor*

WEAVING A CHILKAT BLANKET AT A CAMP ON A SALMON RIVER

The blanket is being made for the man of the family who stands at the left. The young girl has stopped in the process of separating the strands of the cedar bark to be used for warp. The woman at the right has looked up from her work of spinning the wool

region, a sense of the mists and the dampness. The attention centers on the boat builder, who is about to drop from long wooden tongs a red hot stone into the water within the canoe from which rises swirling steam, while the glow from the ember fire illumines his well-developed figure and reveals an intensely interested face. The cloud of steam gives life and movement and plays a strong part in the pictorial composition and color scheme, while the diffusing mist veils subordinate detail and holds all in harmonious relation.

#### THE THIRD PAINTING

##### *The Butter Makers*

In this delightful composition, which Mr. Taylor calls "The Butter Makers," we find the *culachon* industry illustrated with much detail. This group of busy Tsimshian is placed in a semi-realistic landscape of great beauty. We discern the flanks of mountains veiled by cloud masses, and the green slopes that reach down to the shore of the Nasse River. The stream is splendid at this point near its mouth where the candlefish come in from the sea. The *culachon* or candlefish are caught during March and April in great numbers with dip nets and rakes or with seines.

This party in the picture has made a temporary camp here in the "lean-to" at the left, to harvest the run. Two methods of preservation are indicated. At the right a man is hanging *culachon* to dry. The other and more important process is the extraction of the oil, which is a greatly valued delicacy used like butter by these people. This oil and the dried *culachon* are exchanged up and down the coast by those Indians so fortunate as to control the catch.

To extract the oil, the fish are permitted to decompose slightly, after which they are placed in boxes of water and kept at the boiling point by the use of red hot stones. The oil is then skimmed off as it rises to the surface, and so precious is it that even the residue is worked over.

The column of light smoke at the left of the painting and the glow of the ember fire indicate the heating of the stones. The woman with the tongs is about to take one of these stones to keep the water boiling in the boxes, and the old woman at the box with the straining mesh is working over the residue.

These quite literal facts are expressed simply while the balance of the composition in line and color mass is well maintained. The artist has invested the whole decoration with poetic charm and the treatment of the clouds, smoke and steam is masterly.

## THE FOURTH PAINTING

*The Bread Makers of the Bella Coola*

This scene is in the beautiful Bella Coola valley, about eighty miles up the fiord at the delta of the river. The narrow valley lies between mountains covered in places with perpetual snow and glaciers.

The purple of the mountains with the delicate greens of cottonwoods ranged along the river's edge, are portrayed in the upper planes of the painting. In the lower plane, beside the winding glacial stream, are swamp lands where skunk cabbage is abundant and hemlocks grow. At the left of the composition the man supported high on the tree trunk is scraping away the inner bark or cambium and dropping the moist strips to the cedar mat held below by the woman and the boys.

The edible value of the cambium is well understood by Indians; that of the pine, spruce and fir is eaten in the spring time, while that of the yellow pine, hemlock and red alder is preserved for winter use. A hole in the ground is lined with hot stones, which are covered with the leaves of the skunk cabbage to keep the bark from burning. Within this the mucilaginous strips are packed and covered with the skunk cabbage leaves, then over all are placed layers of bark and cedar mats. In four days the cambium steamed to a pulp is ground with a pestle on a flat stone, then formed into brick-like cakes and dried in the sun.

This fourth painting has especial distinction because of the sense of space conveyed and of the highly picturesque character of the landscape. The simplicity of the grouping of the figures and the admirable arrangement of the masses of light and dark coloring complete a composition which cannot fail to have lasting charm.

Both the Museum and the artist are to be congratulated. Not every painter would have striven with such sincerity to tell the simple stories of the handicrafts of these various tribes. The color scheme holds together in these four canvases as well as it would in a suite of old tapestries. There is self-restraint and subordination of detail; and there is good measure of the literal and the educational. Art has prevailed over all. Mountain mists and steam-clouds are gracious mediums for invoking the ideal; and yet these are good portraits of the lands where live the Tlingit and the Haida, the Tsimshian, and the Bella Coola.



*From mural panel by Will S. Taylor*

#### A BELLA COOLA FAMILY MAKING "BREAD"

The man is gathering hemlock bark, which is later steamed in holes in the ground lined with hot stones; thus is made a kind of native bread

In each canvas the figures are good type portraits of the tribe represented



SUPERNATURAL THUNDERBIRD CHARMS OF THE GAME ON THE MAT AT THE LEFT



THE PRIZES CONSISTING OF BLANKETS AND STRIPS OF CALICO



SORTING THE STICKS AND SO CHOOSING SIDES

## THE MENOMINI GAME OF LACROSSE

*By Alanson Skinner*

Photographs by the Author

THE Menomini Indians, about fifteen hundred in number, are intelligent and progressive farmers dwelling for the most part in substantial log cabins and frame houses on their reservation in northern Wisconsin, yet about one half of them adhere to their ancient ceremonials and to the legends of their race. One of my early experiences after reaching the reservation in the summer of 1910<sup>1</sup> was attendance upon a ceremonial to the Thunderers, given to appease the wrath of these Indian gods of the storm, so that there might end the drought from which the country was suffering; and another consisted in witnessing a ceremonial game of lacrosse, which is interwoven with the legend of the Thunderers and revolves about the idea of the birth of these spirits in man.



THE GAME STARTS

At the lacrosse game the Menomini nation was well represented. The smooth field stretched before us. The prizes, blankets and strips of calico, were hung at one side. Warriors rapidly gathered as the chief moved toward the place where the prizes were displayed. They gathered in a

<sup>1</sup> The gratitude of the Museum goes to the Wisconsin friends who contributed to the success of this expedition of 1910. Those to whom greatest indebtedness is due are Special Agent of the United States Government, Mr. Angus Nicholson, and all his staff, as well as the late agent, Mr. Wilson. As for the Indians, those to whom thanks should be given are very many. Perhaps the ones who have been most liberal and helpful are Mr. John V. Satterlee, Chiefs Perrote, Wiuskacit and Niopet, Messrs. James Blackcloud and Antoine Shibicow, and Jane Shibicow and Mrs. Petwaskun.

dense mass about him while he entered upon a speech advising how to play the game to the satisfaction of the Thunderers. As soon as this ended attendants passed among the warriors and collected the game sticks and bringing them to one spot mixed them well together, afterward quickly spreading them out in two opposing rows on the grass. The players followed watching, each making an effort to locate his own stick in one row or the other. When he had done so he knew on which side he was to play and also, for by that time each warrior was standing before his own stick, just who were to play with him, who against. The warriors of one side marked the left cheek with a heavy stroke of vermilion for recognition in the game. Each took up his stick and all seemed ready and waiting for some signal. Suddenly a ball was tossed into the center of the crowd and with many whoops and a great rush the game was on.

The following is the story connected with lacrosse as gained through the interpreter from one of the oldest Indians of the tribe. Knowledge of the legend makes clear many things about the game, such as the honored position near the prizes accorded to the supernatural war club and lacrosse stick belonging to the Indian giving the game.

You ask who are the Thunderbirds. I will tell you. You have seen the black clouds roll up in the spring. You have seen the rain fall heavily and you have seen the great flashes of light that shoot from the heavens, and you have heard the rumbling noise that follows. What the Wabskuat (Paleface) says of these things I do not know, but the Indian understands well that they are made by the Thunderbirds hunting.

Far, far away in the West where the sun sets, there floats a great mountain in the sky. Above the earth the rocks lie tier on tier. These cliffs are too lofty to be reached by any earthly bird. Even the great war eagle cannot soar so high. But on the summit of this mountain dwell the Thunderbirds. They have control over the rain and the hail. They are messengers of the Great Sun himself, and their influence induced the Sun and the Morning Star to give the great war-bundle to our race. They delight in fighting and great deeds. They are the mighty enemies of the horned snakes, the Misikinubik. Were it not for the Thunderers these monsters would overwhelm the earth and devour mankind. When the weather is fair, then watch when you travel abroad, for the snakes come out to bask in the sun, but when the weather is cloudy you need fear nothing, for the Thunderers come searching from behind the clouds for their enemies, the Misikinubik.

Now this is true and our people know it well, that these Thunderers have a great love for us. Often they come down to earth and are born as men. He who bears a Thunderer's spirit has power to understand nature and to foretell the weather and he is strong in war. But a man who has such a spirit is not like other Indians. As a child his parents never punish him for fear his spirit will be shamed and leave his body. Instead they honor him and make for him a war club and lacrosse stick, the one to protect him in time of war, the other a symbol that he is a child of the Thunderers. For lacrosse is a warlike game and therefore the Thunderbirds delight in it. Anyone who has a Thunderer's spirit in him must have the game played at least once a year. He must offer great prizes to the winner of his game and he must





THE CHIEF INSTRUCTS THE PLAYERS

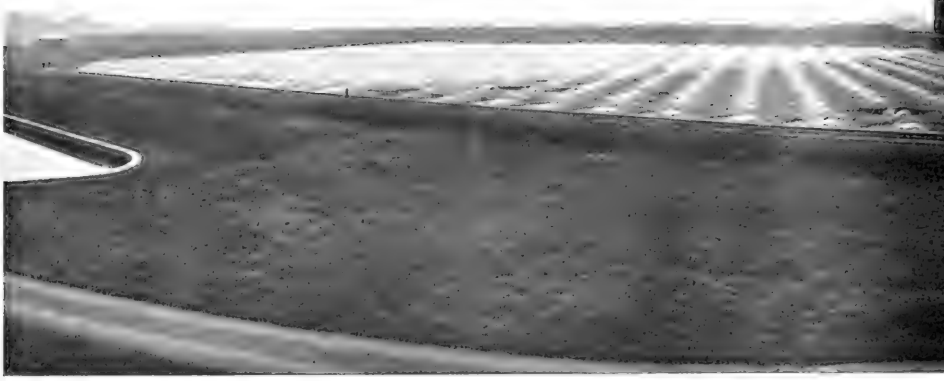
send out gifts of tobacco to all the people as an invitation to come and play. He himself takes no part but sits and watches and the Thunderers are satisfied.

Before I left the reservation I saw three additional ceremonial lacrosse games, besides other interesting ceremonies such as that of the Society of Dancing Men. Ceremonies of all kinds among the Menomini are becoming more and more curtailed every year and adherence to legendary lore more rare, and it is probably a question of only a few years more when all will have passed into tradition.

The Menomini Indians have always been exceedingly friendly toward the white man and they were well pleased when they learned that a systematic effort was to be made by the American Museum to record their old life and collect their ancient articles. In the words of Chief Niopet, who presented the Museum with several handsome examples of beadwork, the following is their idea: "We wish to put these things into the 'great house' where they will be kept with care, where our children's children may go to see them when our race has followed the white man's road until it has forgotten their use."



A SCRIMMAGE NEAR THE GOAL. THE FIRST SIDE SCORING FOUR GOALS WINS



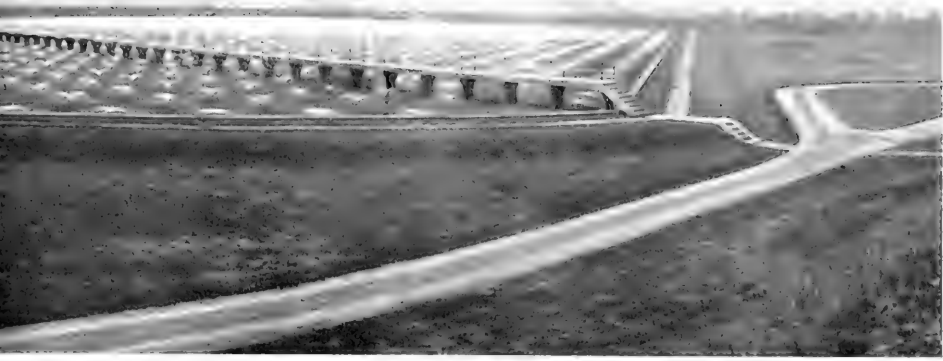
## A QUESTION OF PUBLIC HEALTH

EXHIBIT OF MODELS ILLUSTRATING POLLUTION OF NEW YORK HARBOR  
WATERS AND SCIENTIFIC METHODS FOR THE DISPOSAL OF CITY SEWAGE

*By C-E. A. Winslow*

CITY life presents pressing and peculiar biological problems. When a great number of human beings are concentrated within a small area, the fundamental needs of individual life must be met by the latest perfected methods. Especially should this hold true in the prevention of epidemics, which always threaten crowded communities; and in guarding against disease the first essential is the proper removal of the waste products which accompany all living processes. One of the greatest problems which confronts a modern municipality is here encountered, for from every large city there pours out a river of waste material which pollutes streams, harbors and foreshores, spoiling what should be the pleasure-spots of the city, damaging property and even endangering health and life.

New York is more fortunate than most cities in the large bodies of water which wash its shores, but to-day the disposal of its waste material has become a serious problem and one which demands prompt solution. The Metropolitan Sewerage Commission which has recently published the results of its important investigations will shortly make an exhibit of its work at the American Museum, and the Museum's Department of Public Health has prepared a series of models illustrating on the one hand local conditions



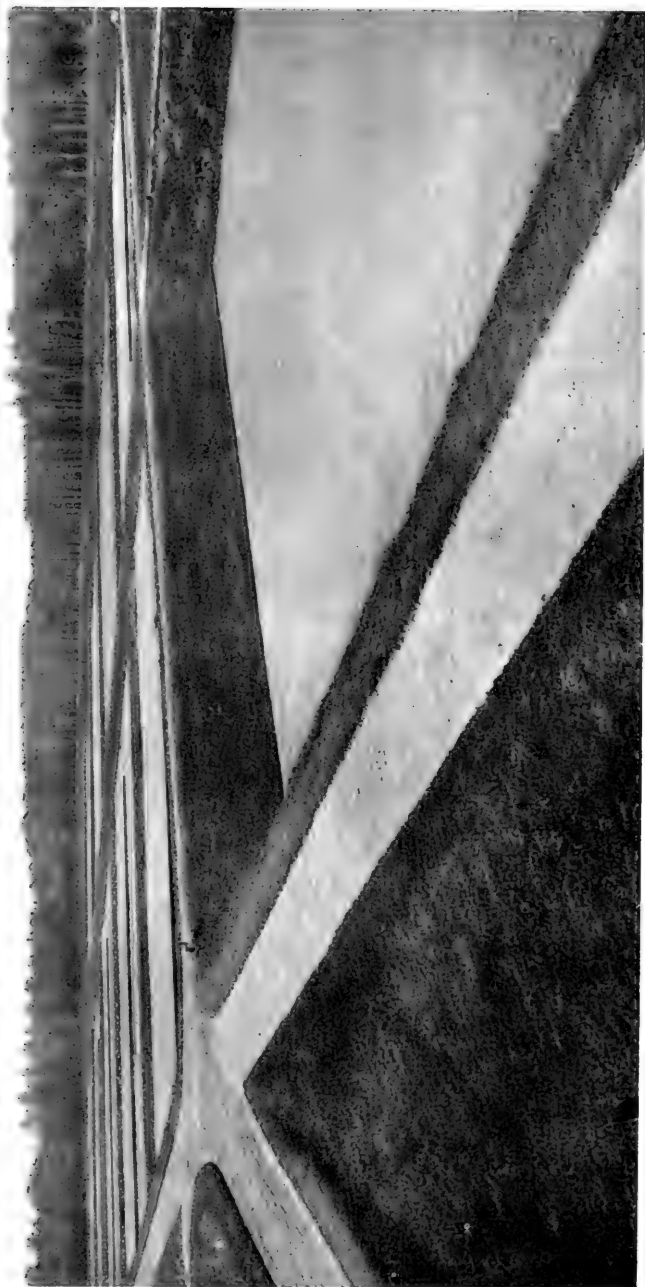
PANORAMIC VIEW OF TRICKLING FILTERS, COLUMBUS, OHIO

The most efficient device yet discovered for the purification of a city's sewage — stones on which bacterial growth may gather and a regulated supply of sewage in fine spray and of air

with regard to harbor waters and on the other hand the various devices which may be used for the disposal of city sewage by sanitary methods.

When sewage is discharged in small volume into a relatively large body of water the aim of all sewage purification is attained. The bacteria normally present in the water attack the organic matter and oxidize it, and at the same time the typical sewage bacteria, finding themselves in an unfavorable environment, gradually die and disappear. In New York, however, the present method of disposal by the haphazard discharge of sewers into the waters of the rivers and harbor at the piers or bulkhead lines, is manifestly unsatisfactory. The sewage oscillates back and forth instead of passing promptly out to sea, and the local nuisances at certain points are extreme.

Besides the fact that this brings about conditions offensive to the senses, real danger to health is involved. The germs of typhoid and other infectious diseases are always present in a city's waste, menacing the lives of those to whom their contact is inevitable. For instance all along the waterfront, driftwood and other floating objects are picked out by the poor and carried to their homes. In Jamaica Bay and neighboring waters shellfish are grown in close proximity to both public and private sewers and while some processes of cookery destroy the typhoid germs, others do not. The greatest risk is run by bathing in the polluted waters and in New York several of the free floating baths maintained by the city are placed sufficiently



*Courtesy of G. E. Balling*

INTERMITTENT SAND FILTERS, BROCKTON, MASSACHUSETTS

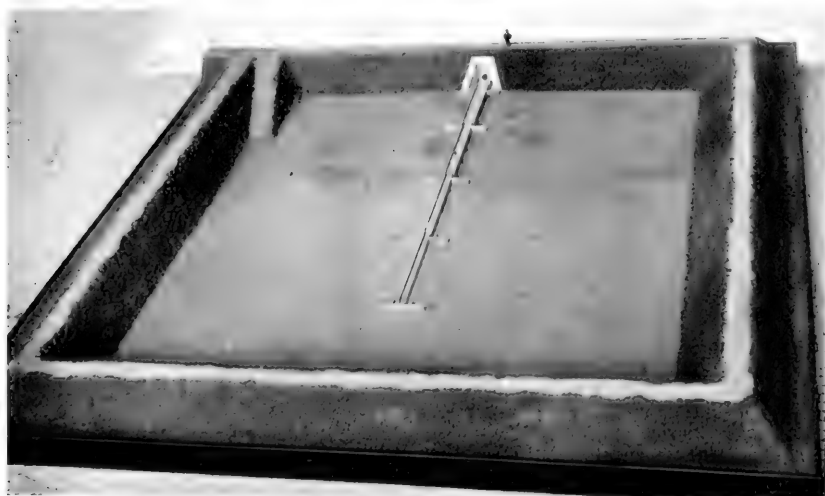
The first problem in the disposal of city sewage is solved by screening. This must usually be followed by some process of sedimentation

near sewer outlets to furnish excellent opportunity for infection of various sorts.

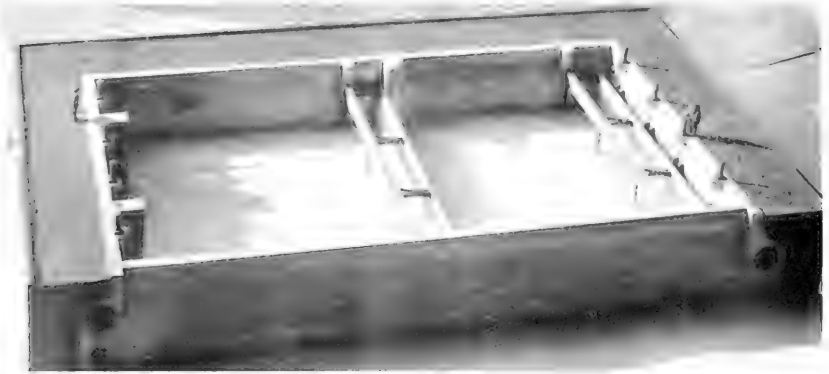
The first problem in the disposal of city sewage is the elimination of the coarser floating particles by some form of screening. In some cases this alone is sufficient, but generally sedimentation must also be employed. In sedimentation excellent results have come from the use of a deep tank having a conical or pyramidal bottom. Into the lower part of this tank the sewage enters, spreads out in the conical section as it rises, progressively diminishes in velocity, and when the effluent flows off at the top, leaves the suspended solids behind.

The sludge which accumulates in the sedimentation tank must itself be disposed of in some way and the modified sedimentation basin known as the "septic tank" is designed to minimize this nuisance by holding the sludge under such conditions that it may be liquified by anaërobic bacteria. One tank of this type, the Imhoff tank used extensively in northern Germany, has met with marked success.

After the removal of suspended solids, the liquid sewage remains to be purified. The most primitive method of disposal consists in its distribution over the surface of suitable land, what is called "broad irrigation." Under proper conditions the living earth renders organic matter harmless and changes it into food material for the higher plants. Paris and Berlin to-day utilize this method of disposal. But broad irrigation requires large areas of land of suitable soil and would be a costly method for a city situated as



Intermittent Sand Filter Bed. Photograph of a model in the American Museum

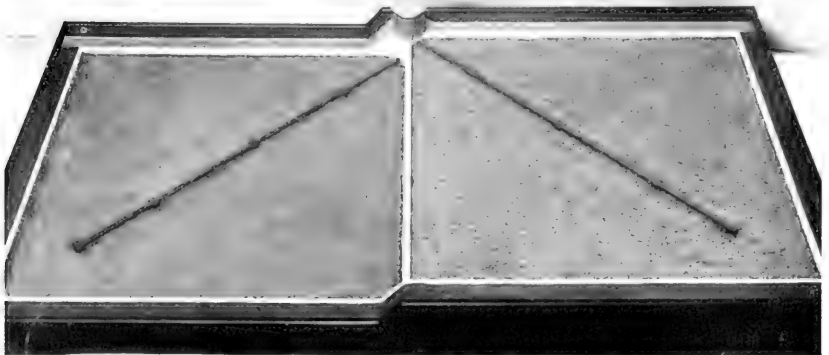


Septic Tank or modified sedimentation basin. Model in the American Museum

is New York, where the waste would have to be carried a great distance before final disposition of it could be made.

At Lawrence, Massachusetts, through the experiments of the Massachusetts Board of Health, a more scientific and intensive modification of the irrigation process was devised known as intermittent filtration. It consists in the application of sewage in regulated quantities to the surface of properly prepared beds of sand in which nitrifying bacteria colonize and oxidize the organic matters in the sewage into harmless mineral form. The construction of this filter is simple in regions like those in the northeastern part of the United States where there is suitable soil from glacial drift.

Even the intermittent filter requires a large area of land however, and



Double contact beds for purification of sewage on the plan of "broad irrigation" but without the necessity of large areas of land. Model in the American Museum

still more rapid processes have been devised to meet the needs of communities which have no ample sand areas at their doors. It was shown by a series of English investigators that the nitrifying bacteria could be grown on coarser materials like broken stone as well as on sand and that by filling a bed with such materials and letting sewage stand in it for a short time in contact with the stone, a considerable purification would take place. Such a purifying device is known as a "contact bed."

The most efficient device of all is the "trickling" or "percolating" bed which represents still another method of combining the three required



Picking up polluted driftwood on the Battery steps. Model in the American Museum

elements, sewage, bacteria and air. In 1894, at Newport, Rhode Island, the late Colonel George E. Waring experimented with the purifying of sewage at high rates by blowing air into a bed of coarse stone from below, while sewage ran down through it from above. Theoretically good, practically the method fell short of perfection; but success has finally been reached along another similar line by applying sewage, not in bulk, but in a fine spray distributed as evenly as possible over the surface of the bed. By this method the liquid trickles in thin films over the surface of the filling

material while the spaces between are continually filled with air. The trickling bed, which may be defined simply as a heap of stones or other material of such size, depth and texture as to support a bacterial growth sufficient for the work in hand, is considered one of the most promising and effective of any known device for sewage purification and particularly well adapted for use in large cities, for it exhibits the simplicity which distinguishes the best scientific application — a pile of stones on which bacterial growth may gather and a regulated supply of air and sewage being the only desiderata. In this way the dangerous organic waste material produced in the city of human habitations is carried out to the city of microbes on their hills of rocks and it is their duty to turn it into a harmless mineral form.

The removal of disease bacteria is not necessarily accomplished by these newer processes of sewage disposal which are primarily designed to remove putrescible organic matter. This end, which is an important one in a seaboard city because of its adjacent shellfish industries, can be met by special chemical treatment. The application of ordinary bleaching powder or chloride of lime in small amounts of fifteen to thirty parts of powder to a million parts of sewage will effect a satisfactory reduction of bacteria at a very reasonable cost.

There are yet many unsolved problems in the purification and disposal of a city's sewage, yet the work of the last ten years in the United States and England foreshadows ultimate success. To-day the engineer is limited in the perfection of his work only by the amount of money the community is prepared to expend; and the City of New York can go as far along this line as its citizens choose to afford. It should unquestionably go farther than it has gone to-day.





## A MODERN MUSEUM OF CELEBES

*By Roy C. Andrews*

WHEN a naturalist's wanderings in the South Seas carry him to a native city of comparatively small white population, and he finds there a museum embodying modern ideas of exhibition, he experiences considerable surprise. It was my good fortune on Christmas Day of 1909 to find such a museum and also to visit it with its founder and curator, His Excellency Baron Quarles de Quarles, Governor of Celebes.

The Albatross had but recently dropped anchor in the Bay of Makassar. While driving in Makassar, the principal city of South Celebes, we came upon a large, oblong building set on piles and having an entrance-way projecting from the front. As usual the little shaggy brown horse drawing the rickety "carametta" in which we were riding was rushing along at a furious pace and we had almost passed the house before we caught sight of an English sign reading "Museum." The building was closed, but its keeper was finally located and although he spoke only Dutch and Malay, we managed to exchange ideas and made a brief inspection of the place.

Later Captain McCormack and myself visited the Museum, conducted by Baron de Quarles, who presented to the American Museum a small collection representing some of the most characteristic features of the native

life of Celebes. The building was formerly the residence of the deposed Raja of Boni, a potentate who for some time ruled one of the large provinces of the Island, and itself furnishes a most interesting example of the royal dwellings of these native princes.

The collections contained in the museum are strictly local, but represent in a form quite complete the basket work and other industries, the dress and customs, in fact all the principal features of the life of the natives in and about Celebes. All the material has been collected and arranged under the supervision of the Governor. Plaster casts have been prepared to illustrate the natives and the dress of the different tribes. There are also miniature models of fish-traps, houses, and boats, as well as models to show pottery making and basketry. Around the walls are hung spears, knives, shields, and other articles of warfare, and their uses are explained by admirable labels in Malay, Dutch and English. One room contains many objects which made part of the furnishings of the household in the time of the Raja of Boni.

The entire museum gives such evidence of attention to details and of thought and care in selection and exhibition of specimens that it reflects the greatest credit on Baron de Quarles. He has extended the scope of the Makassar Museum's work by making up and presenting to expositions in various countries of Europe collections representing the chief features of the ethnology of the natives of the Celebes. It is to be hoped that there will be a continuance of the growth of this institution which, although the years of its existence have been few, is already doing important educational work, and that the example so admirably set by Baron de Quarles will be followed by the officials of other native cities.

#### MUSEUM NEWS NOTES

OWING to ill health, Dr. J. A. Allen, Curator of Mammalogy, has given up his duties as Acting Director and the President has appointed Dr. E. O. Hovey, Curator of the Department of Geology and Invertebrate Palaeontology to serve as Acting Director pro tem during the absence of Dr. Townsend.

THE Department of Anthropology has recently received the gift of a Sioux tepee made entirely of buffalo skins. This tepee is of peculiar interest from the fact that for at least the past thirty years buffalo skins have not been used in Indian house construction.

MR. FRANK M. CHAPMAN sailed from New York March 14 for Colombia, South America, where he is to join Mr. William B. Richardson, who has been in that locality collecting birds and mammals for the Museum for several months. Mr. Chapman expects to get into a region where no collecting of birds has been done; there he will make a systematic survey, probably obtaining some undescribed species and many new to the Museum collections. He will also get material for several new bird groups. He has taken an assistant and expects to remain until July, when Mr. Richardson and the assistant will continue the work.

DR. GEORGE H. Girty of the United States Geological Survey, who has recently presented to the Museum a series of fossil invertebrates, has been made a Life Member of the Museum in recognition of his generosity.

AT the meeting of the Executive Committee on March 22, Mr. Frederick H. Smyth was appointed to the position of bursar of the American Museum of Natural History, the appointment to take effect April 1, 1911.

THE METROPOLITAN SEWERAGE COMMISSION in coöperation with the Department of Public Health of the American Museum will hold an exhibition at the Museum during the last two weeks of April. The exhibition will illustrate conditions of sewerage and sewage disposal in the metropolitan district of New York and will include models, charts, diagrams and apparatus used by the Commission in its investigations.

THE HALL OF MOLLUSCS which has been removed from the fifth floor to make room for the new administrative offices is still in preparation and will not be open to the public for some time. The shell collections of the Museum, which are among the earliest of its acquisitions, are being rearranged in accordance with the modern spirit of museum exhibition.

PUBLIC meetings of the New York Academy of Sciences and its Affiliated Societies will be held at the Museum according to the usual schedule. Programmes of meetings are published in the weekly *Bulletin* of the Academy.

## LECTURE ANNOUNCEMENTS

### PUPILS' COURSE

These lectures are open to the pupils of the public schools when accompanied by their teachers and to children of Members of the Museum on presentation of Membership tickets. Mondays, Wednesdays and Fridays at 4 o'clock.

March 20 and April 17 — MR. ROY W. MINER, "Early Days in New York."

March 22 and April 19 — MR. ROY C. ANDREWS, "A Visit to the Orient."

March 24 and April 21 — DR. LOUIS HUSSAKOF, "Scenes from Pole to Pole."

March 27 and April 24 — MR. JOHN T. NICHOLS, "Natural Resources of the United States."

March 29 and April 26 — MR. WALTER GRANGER, "Famous Rivers of the World."

March 31 and April 28 — MR. HARLAN I. SMITH, "Life among Our Indians."

April 3 and May 1 — MR. ROY C. ANDREWS, "Travels and Life among the Japanese."

April 5 and May 3 — DR. LOUIS HUSSAKOF, "South American Scenes."

April 21 and May 5 — MRS. AGNES L. ROESLER, "Around the World with Children."

### PEOPLE'S COURSE

*Given in coöperation with the City Department of Education*

Tuesday evenings at 8:15 o'clock. Doors open at 7:30.

The last four of a series of lectures on "Great Modern Composers" by DANIEL GREGORY MASON. Illustrated at the piano.

April 4 — "Peter Ilyitch Tschaikovsky."

April 11 — "Johannes Brahms."

April 18 — "Richard Strauss."

April 25 — "Present-day Tendencies."

Saturday evenings at 8:15 o'clock. Doors open at 7:30.

April 1 — MR. ALBERT HALE, "Central America: Costa Rica, Nicaragua, Honduras, Salvador and Guatemala." Illustrated.

April 8 — MR. ALBERT HALE, "Mexico: Our Nearest Neighbor." Illustrated.

April 15 — MR. CHARLES R. TOOTHAKER, "Panama and the Canal." Illustrated.

April 22 — Subject and lecturer to be announced.

April 29 — PROF. WILLIAM LIBBEY, "Hawaii." Illustrated.

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THE AMERICAN MUSEUM  
OF  
NATURAL HISTORY

FOR THE PEOPLE  
FOR EDUCATION  
FOR SCIENCE

# THE AMERICAN MUSEUM JOURNAL



GATHERING PINE SEEDS FOR PLANTING

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THE MUSEUM LIBRARY contains more than 60,000 volumes with a good working collection of publications issued by scientific institutions and societies in this country and abroad. The library is open to the public for reference daily — Sundays and holidays excepted — from 9 A. M. to 5 P. M.

THE MUSEUM PUBLICATIONS are issued in six series: The American Museum Journal, Annual Report, Anthropological Papers, Bulletins, Guide Leaflets and Memoirs. Information concerning their sale may be obtained at the Museum Library.

GUIDES FOR STUDY OF EXHIBITS are provided on request by the Department of Public Education. Teachers wishing to bring classes should write or telephone the Department for an appointment, specifying the collection to be studied. Lectures to classes may also be arranged for. In all cases the best results are obtained with small groups of children.

WORKROOMS AND STORAGE COLLECTIONS may be visited by persons presenting membership tickets. The storage collections are open to all persons desiring to examine specimens for special study. Applications should be made at the information desk.

THE MITLA RESTAURANT in the east basement is reached by the elevator and is open from 12 to 5 on all days except Sundays. Afternoon Tea is served from 2 to 5. The Mitla Room is of unusual interest as an exhibition hall being an exact reproduction of temple ruins at Mitla, Mexico.



# The American Museum Journal

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MARY CYNTHIA DICKERSON, *Editor*

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DESIGN FOR NEW EASTERN FACADE OF THE MUSEUM, FACING CENTRAL PARK. PRELIMINARY SKETCH. TROWBRIDGE AND LIVINGSTON ARCHITECTS

In the design for this Eastern Facade, the architects have endeavored to retain the general Romanesque architecture of the Southern Facade, while modifying it in the direction of greater simplicity. The design contemplates the future incorporation of the Museum within the general design of Central Park by the construction of a broad entrance roadway from the West Drive.

# The American Museum Journal

VOL. XI

MAY, 1911

No. 5

## PLANS FOR EXTENSION OF THE MUSEUM

PRELIMINARY STUDIES TOWARD AN EXPANSION OF THE AMERICAN MUSEUM SUCH THAT FORCE AND A WIDE SCOPE WILL BE GIVEN TO THE INSTITUTION'S EDUCATIONAL WORK IN THE GREAT NEW YORK OF THE FUTURE

*By Henry Fairfield Osborn*

WITH this number is presented a preliminary study by Messrs. Trowbridge and Livingston, architects, for the new East Façade of the Museum, facing Central Park. The design has not been adopted either by the Committee on Buildings and Plans or by the Trustees, but its preparation at this stage is welcomed because of the opportunity which it affords for a prolonged and careful consideration of the artistic requirements of a monumental building, and of the scientific and educational requirements of ideally related exhibits within this building. The design for the East Façade contemplates the future incorporation of the Museum within the general design of Central Park by the construction of a broad entrance roadway from the West Drive. Ultimately, no doubt, the lower reservoir in Central Park will be removed and an avenue of approach will connect the east and west sides of the Park and thus unite the Museum of Science with its sister Museum of Art at Eighty-second Street. This is in the far future, but nevertheless it deserves the early consideration of all those who are interested in the artistic growth of what is probably destined to be the greatest city of the world.

In the design of this Eastern Façade, the architects have endeavored to retain the general Romanesque architecture of the Southern Façade, while modifying it in the direction of greater simplicity. It is obvious that a building of the vast proportions contemplated in the original plans of Calvert Vaux in 1871 and authorized by the Legislature in connection with the setting aside of Manhattan Square, must have an entrance of monumental size, and that this entrance must have a broad and dignified avenue of approach.

The Museum will thus have three entrances. On Sundays and holidays when people come in large numbers from the direction of the Park, the Eastern Entrance will be most convenient together with the present

historic South Entrance, with its included Memorial Hall constituting a monument to the administration of President Jesup. During the entire summer season these two entrances, the Southern attracting by its shaded approach, will be most accessible; while for purposes of attendance at public lectures and for large classes from public schools, the contemplated Western Entrance will prove the most practical and readily accessible to the arteries of transportation of the city of the future.

Since assuming office in 1908 the President's interest has largely centered in a series of studies for the future development of the interior of the Museum<sup>1</sup> to provide at once for expansion and to look toward an ideal future in an arrangement made both from the standpoint of a natural sequence and of an artistic impression upon the minds of visitors. A great natural history museum should impress the visitor with the grandeur and beauty, and with the orderliness and system of the processes of nature. Especially is natural sequence important, not only sequence of the exhibitions in each hall but also of the successive halls themselves. This is an educational principle of the utmost value. It is as important in natural history as it is in art. Visitors to the Berlin Museum will recall the simplicity and direct educational value of the arrangement of the picture galleries according to the sequence of Schools of Art in various countries. Exactly the same idea applies to a museum of natural history, yet with the exception of the Museum of Comparative Zoölogy of Cambridge, arranged by the late Alexander Agassiz, no large scientific museum, to our knowledge, has yet embodied the idea of the natural relations of subjects or of the consequent natural groupings.

In a geographic sequence for instance, the visitor would pass from country to country, as in course of travel. In studying the prehistoric life of North America, he would naturally pass from east to west; he would study the former inhabitants of Manhattan Island and the neighboring tribes along the eastern coast; then pass to the Central West, to the region of the Great Plains, to the Indians of the Southwest, and finally, to the past and present history of Mexico and Central America. Such geographic arrangement can be made to prevail naturally to a large extent on the western or anthropological side of the Museum and also in certain halls on the

<sup>1</sup> There are now in preparation two publications in which the proposed interior arrangement of the Museum will be set forth. The first of these is the second or Curators' edition of the work entitled 'History, Plan and Scope of the American Museum of Natural History,' the Trustees' edition of which was published in 1910. The second publication is an illustrated folder showing the gradual steps which have been made in the development of the Buildings of the Museum, beginning with the completion of the original South Transept in 1877 and ending with the presentation of the proposed future arrangement of the halls in the completed central portion and southern half of the Museum, the plans for which are now in the hands of the architects. The northern half of the Museum is left entirely for future consideration.

zoölogical side. In the latter, a geographic arrangement is known as faunistic. The visitor may first enter the life of Africa and Australia, follow into the life of Southern Asia, which we know historically to be only a detached portion of prehistoric African life; he may then pass to the life of Northern Asia which will bring him to the Polar Region, from which he will enter naturally the life of North America and pass southward into Central and South America.

There is, however, another kind of sequence to which other series of halls of the Museum may be devoted — namely, the sequence of evolution. Thus on the anthropological side the visitor may compare the more primitive races of man, including the origin of man, with the more civilized races; he may follow the slow steps of progress from our very remote ancestors of two hundred thousand years ago through the so-called Eolithic stages until he reaches Man of the Bronze and of the Iron Ages. Similarly he may trace the first steps of nature and the subsequent stages from the lower into the higher forms of plant and animal life.

The most impressive example of evolutionary sequence will be the series of connecting halls, to which it is hoped the Fourth Floor on the east side of the Museum may be devoted. Here the visitor will pass from the dawn of life reaching back millions of years, and in successive halls traverse the Ages of Molluses, of Fishes, of Amphibians, of Reptiles, finally reaching the first Age of Mammals, and then the Age of Man. In this final hall he may witness the earliest struggle between the primitive types of palæolithic hunters and the noble forms of mammalian life which were to be found both in Europe and North America in the early period of man.

There is still a third kind of sequence, that of systematic classification, which must be provided for in another series of halls. This is the prevailing system of all our great natural history museums of the present day, with the exception of the Agassiz Museum at Cambridge, in which the animals for the most part are arranged geographically. In the sequence of classification, the visitor will find all the animals of a certain kind, from whatever part of the world they may have been collected, assembled for comparative study. Thus for example, he will be able to compare with one another all the members of the Horse Family whether collected in Africa, in Western Europe or in Asia.

It has proved possible to provide amply in the development of the southern half of the great American Museum building of the future for all three of these various kinds of sequence — geographic, evolutionary and systematic. The plan, in its general features, will be submitted for the approval of the members of the Scientific Staff of the Museum. It has already been welcomed by experts from other institutions in this country

and abroad as marking a very important advance in the educational arrangement of natural history museums. It is believed that this arrangement will meet both the exacting demands of the specialist and also impress upon the minds of the uninitiated visitors, young and old, the greatest lesson, perhaps, that Nature has to teach us — namely, the reign of law and order.

There are, however, other objects to be attained in the new plans for the enlargement of the Museum. Chief among these are ample provisions for branches of natural sciences which heretofore have not been included within the field of any museum of natural history, but have been presented more or less successfully in isolated forms in kindred museums. These are principally the subjects of Astronomy, of Geography and of Oceanography. Berlin has its popular Astronomic Museum known as "Urania." It also has its Oceanographic Museum, established under the patronage of Emperor William as a result of the extraordinary interest aroused in oceanographic research by the voyage of Nansen and of suggestions made by Sir John Murray in Berlin at the subsequent Geographic Congress. Later a finely equipped oceanographic museum was established at Monte Carlo by the Prince of Monaco in connection with his own marine explorations. More recently the Prince has established an Institute of Oceanography in Paris. To our knowledge however, there is no museum at present devoted to Geography or to Physiography. Yet these subjects are quite as intimately related to the distribution of animals and plants and to the general laws which govern living beings as is Oceanography.

The interest of the public in Astronomy has already been witnessed in the American Museum in the models of the planetary system at present installed on the First Floor and of the rotating earth on the Second Floor. There is no doubt that a treatment of both Geography and Oceanography would subserve the public educational needs of the City. It is far better for the American Museum to bring these subjects within its walls in New York City and thus assemble all the phenomena of nature under one roof, rather than to wait until smaller institutions for these branches spring up as they are doing in Berlin, in Paris and in other cities.

Thus in addition to designs for the future building itself, careful study is being put on the ideal arrangement of subjects and collections within this building. This study takes into account the broad relations of the living and inanimate worlds as conceived in the minds of Humboldt, Darwin and other great naturalists. These relations underlie the physical welfare of man. They cannot be omitted from the plan. In fact the American Museum in the establishment of its Department of Public Health has already entered this new field of service and of public instruction, which will bring still closer within its influence the well-being of the people of New York.

## OCEANOGRAPHIC WORK ON THE ALBATROSS

THE Museum Expedition under Acting Director Townsend in the United States Fish Commission Steamship Albatross continues the land collecting in Lower California and the oceanographic work in the waters adjacent according to prearranged schedule. The following quotations from Dr. Townsend's letters give suggestions of the expedition's work.

MAGDALENA BAY, L. C., *March 18, 1911*

We left San Diego March 7 for work farther south. The program is being carried out very much as originally planned, that is we spend our days ashore and our nights at sea, jogging along slowly and economically with steam on one boiler only. Four or five days at each anchorage would be better than merely one or two, but even as it is we shall have a fair representation of the sea and land fauna of Lower California. Occasionally we take half a day for a run out beyond the five hundred fathom line to dredge. Mr. Bell has already some fine molds of deep sea fishes and invertebrates; however, we shall do three times as much dredging on our return trip, not having to land shore parties.

The collection of shore fishes and invertebrates is naturally the largest. A few sweeps of the large seines give us barrels of fishes to select from, while invertebrates are easy to get at low tide.

We visited San Benito and Cedros islands, obtaining fair representations of the land forms peculiar to them. We shall do some deep-water dredging on the way to Cape St. Lucas, our next stop.

The climate could not be better. The awnings are spread, and I am sorry to see the days slipping by so rapidly.

LA PAZ, L. C., *March 26, 1911*

To-morrow evening we begin to move up the Gulf, taking in both islands and mainland. We now have about five hundred birds, with other land forms in smaller numbers. Going up the Gulf coast we shall make trials for mountain sheep and antelope. We have coyotes, rabbits, wood rats and mice in large numbers.

Dr. Rose will have the bulk of the collections. His boxes, crates and barrels of villainous cacti are filling the ship.

GUAYMAS, MEXICO, *April 15, 1911*

After leaving La Paz, the Albatross made a trip up the Gulf as far as Angel de la Guarda Island. From there we crossed the Gulf to Tiburon Island, then to San Estéban Island, coming from there to Guaymas to-day. We leave to-night for La Paz to get coal for the homeward voyage, calling at Santa Catalina, Espiritu Santo and Cerralvo islands. We have 600 birds, 200 mammals, perhaps 400 lizards and snakes. We are shipping to the New York Zoölogical Park by express to-day two crates of live snakes and large-sized lizards.

Our collections are largely from unexplored islands and undoubtedly contain new species. We shall pick up some good things on the islands between here and La Paz; then dredge in deep water all the way to San Francisco.



A "fossil aquarium" which has now been put in place in the fish gallery gives an idea of what can be done in making these ancient forms appear as living and the experiment has proved so successful that the series will be carried on, the means having already been provided in the Cleveland H. Dodge Fund. The plan is briefly this: to select the characteristic periods or "ages" of fishes and to make each period the theme of a reconstructed group. The completed group illustrates the typical "age of fishes," Devonian, in which the forms represented came from a single locality (Cromarty) and a single rock layer in the Old Red Sandstone of Scotland, with the best evidence therefore, that the creatures shown really existed side by side.



## THE NEW "FOSSIL AQUARIUM"

*By Bashford Dean*

FOSSIL fishes have a special meaning to those who seek light upon the history of the backboneed animals. They occur in practically all layers of rock which yield fossils, having lived during a longer range in time than amphibians, reptiles and mammals; and it is well known that in the succession of the fishes from age to age, one can trace the changes which have taken place in their kinds and can show how some kinds became transformed into others, and thus how evolution proceeded.

However interesting this may be in theory, everyone will admit that it is a difficult matter to make clear to the Museum's visitor the lesson of fossil fishes, or even to display them in an attractive way. As a rule they appear in slabs of rock only as faint impressions of what they were in life, and he who enters the fossil fish gallery, if he has no knowledge of fishes, is not apt to examine these slabs of rock attentively and try to learn their meaning. He is more interested when he sees models of living fishes placed side by side with their fossil relatives, and he is still more interested if he sees a restoration, better in a cast than in a picture, of the fossils themselves. Such a restoration may in many cases be legitimately provided since the fossil fishes in their numerous specimens give the facts clearly upon which models can be prepared.

A "fossil aquarium" has now been put on exhibition in the fish gallery. With it is a label explaining the Devonian age, naming the fishes illustrated and telling how the more ancient groups are giving place to the more modern ones. Thus it is shown that the race of bony fishes, which represents about ninety-nine per cent of all living fishes, had not yet appeared; that on the other hand, the tribe of sturgeons and garpike, now almost extinct, made up about a quarter of all Devonian forms; that sharks, which are but a small fractional percentage of all living fishes, made up about one-third of all kinds then known; while finally, that the placoderms, a group long extinct and even of uncertain kinships, constituted forty per cent of the ancient fish fauna.

In preparing this "fossil aquarium," questions as to the nature of the water, the character of the bottom and its vegetation were investigated by Dr. Hussakof; the models of the fishes were prepared after restorations of specialists, but revised in numerous points in accordance with actual specimens. The colors could not, of course, be given infallibly; the best that could be done was to follow the nearest living relatives of the ancient forms. The design of the group and the color work were carried out by Mr. Charles R. Knight, and his results are realistic and attractive.



### A TREE CLIMBING RUMINANT

By W. D. Matthew

IT seems somewhat paradoxical to imagine a ruminant climbing trees. There are stories of goats doing so, but these stories seem to be more or less apocryphal as far as any real climbing goes. Even the narrow sharp-pointed hoofs of a goat do not give the necessary grasp, and his limbs and feet are too stiff and limited in their motion. The only living members of the Ungulata or hoofed mammals which really climb trees are the coneys or hyracoids, especially the little tree-coney or *Dendrohyrax* of South Africa. This little animal, about the size of a rabbit and somewhat like one in appearance, is in many respects the kind of animal from which we conceive that all the Ungulates are descended, and like the earliest fossil Ungulates it has four separate digits on each forefoot and a rudiment of the inner digit. This kind of foot, and the more flexible limb with which it is associated, enables him to climb readily, to cling to branches and to live in the trees as well as on the ground. A similar adaptation is seen in most of the clawed animals or Unguiculates; while we find the limb and foot still further adapted to arboreal life in all of the Primates except man.

All living hoofed animals however, except the *Hyrax*, have the feet modified for walking and running upon the ground, in such a way as to gain in speed and endurance at the expense of a loss in flexibility of the feet, and none of them are able to climb trees. This is especially true of the Ruminants, in which the foot is very much specialized for running purposes, the metapodial bones of the two middle digits united into a single bone, the "cannon bone," and the two outer digits reduced to little rudiments known as "dew-claws," so that the animal walks and runs entirely upon the tips of the hoofs of the central digits. Compare this type of foot with the soft flexible sharp-clawed foot of a cat, and it is easy enough to see why a cat can climb a tree and a ruminant cannot.

The most primitive extinct ruminants had four separate digits of nearly equal size, and this condition is retained in all the Oreodonts, a family of pig-like Ruminants very common in North America during the Tertiary. But these Oreodonts were probably quite as exclusively terrestrial in their habits as the modern pigs and peccaries, in which the digits are also separate, although the side toes are much reduced in size.

The *Agriochærus* however, while a member of the Oreodont family, and like them provided with ruminating teeth, had the limbs and feet modified in such a way as to enable it to climb trees as readily as a jaguar or other large cat. The hoofs are so narrowed as to be actually converted into a sort of claw; the articulations of the digits, wrist- and limb-bones are modified so as to give throughout limbs and feet the same flexible joints which we find in the cats and in all tree-climbing animals. The animal also differs from the other Oreodonts in that the front teeth are adapted for browsing upon leaves and twigs instead of cropping grass or other herbage.

These modifications from the usual Oreodont type appear to be adaptations for climbing trees to feed upon their foliage. This theory is embodied in the mounted skeleton of *Agriochærus*. The animal is represented as walking out along a sloping branch of a tree, the branch being modeled in imitation of the fossil tree trunks often found in the Tertiary formations of the West. Like any large cat in a tree, he seems a little uncertain and shaky in his movements, and is inclined to cling tight with bent limbs, lacking the assured and confident step of a truly arboreal animal such as a monkey or lemur.

The *Agriochærus* lived during the Oligocene epoch in Western North America, and then became extinct. Why, we do not know, but we may suppose that it was only partly arboreal, and that the handicap of its clumsiness upon the ground was more than enough to offset the advantage of being able to climb trees, when pursued by the improved races of Carnivora that were being evolved about this time.

## BAGOBO FINE ART COLLECTION

By Laura Watson Benedict

THE tendency of a savage tribe to express its love for beauty in the form of decorative art is shown in some detail in a collection from the Bagobo tribe of southern Mindanao, recently installed in the Philippine Hall. Whether we examine basketry or wood-carving, textiles or embroidery or beadwork, we find a minute attention to form, a correct sense for color contrasts, a fine discrimination in decorative finish.



A Bagobo youth from the mountains of southern Mindanao in typical beaded dress. The Bagobo has a passionate love for decoration

The Bagobo tribe, numbering a few thousand, forms one of the groups of pagan Malays living clustered in villages over the mountains and foothills that range back from the west coast of the gulf of Dávao. They are a people of singular beauty, with clear golden-brown skin, earnest wide-open eyes, and mobile faces changing from deep seriousness in repose to sparkling vivacity in conversation.

In dress both women and men have unusually good taste and as fashions never vary from generation to generation, there comes no mandatory decree to change a good style. A more picturesque sight is rare to find than a party of Bagobo coming down a mountain trail in single file, walking with swift free step, the men in short trousers and open jackets, long black hair streaming over their shoulders, and richly beaded carrying-bags on their backs; the women in scant-bodied, scarlet-sleeved *camisas* and straight skirts woven in lustrous pictured patterns, and wearing their hair in glossy coils secured by beaded combs. Bright-colored kerchiefs adorn the heads of women and men; sparkling in their ears are ivory and inlaid plugs; around their necks hang pendants of finely carved seeds and braided beadwork and strung petals. Tassels of sweet-scented roots and toothbrushes of boars' bristles dangle from jacket and neckband, while bordering bag, basket and scabbard, and tinkling from hollow leglet or armlet are hun-

dreds upon hundreds of tinkling bells that announce the approach of the Bagobo.

If the Bagobo people could come to New York and see their belongings arranged in a great hall in sight of all visitors, their joy would be unbounded. When I made this collection in the Bagobo country, the people came flocking daily to my little nipa hut, less perhaps to visit me than to see their own things and identify each other's property and get current prices on jackets and trousers. Nowhere else in their villages could they find such a lot of Bagobo objects together, or test so many guitars and flutes, or examine such a bristling array of spears. That an American should want Bagobo specimens called forth no surprise; rather it seemed to them highly natural that every scrap of Bagobo workmanship from a richly decorated war shield down to some mean and filthy garment should be sought after and prized, for all the Bagobo admire every Bagobo product with a self-complacency that is both amusing and appealing. "Bagobo things, *Señora!*" came the password always uttered with an exultant note as a preliminary toward higgling the market with me.

On reaching the Islands, I heard on all sides from white foreigners that it was almost hopeless to try to secure Bagobo objects, that the time was past for making a collection. It is true that a Bagobo parts with any one of his possessions reluctantly, and prizes each at double its material value because of intimate personal associations. But up to that time no account had been taken of certain emotional interests that had never before been appealed to, and that found expression as soon as a big collection began to grow. There was an undefined pleasure in knowing that over yonder in the *Señora's* house their things were perpetually in contact with other Bagobo things. Now when Atun made the rounds of my little museum and asked the usual questions: "Whose is this? How much did you



Her leglets are made of tubes of brass which contain metal balls that roll freely and produce a tinkling sound as she walks

pay for it?" he had a left-out-feeling if he found nothing that represented himself. But if he could hold up just one article and say, "Kanak" (mine) or "My wife made it," he would give a radiant smile and sit down content.

Again, there was an appeal to the conservative tendencies of the people. More than one thoughtful Bagobo expressed a lively satisfaction at the prospect of a great Bagobo collection being carefully kept in an American museum forever. When the news spread there awakened a new feeling toward my work. One old woman secretly brought me a rare embroidered

scarf, an heirloom that she handled tenderly, for her mother had worn it to hold the baby on her hip, and she said that it had carried many, babies, that few old women remembered how to do that sort of needlework, and that she would never let it go, except that it might always be with the rest of the Bagobo things in America.

That piece of embroidery was done under conditions hard to comprehend. During the day Bagobo women have little time for fancy stitching, with all the cooking and the long climb to the river for water and the work of the loom — for the weaving must be done by daylight, as no native lamp can illumine the floor space covered by the hand loom. But when darkness falls sewing and embroidery can be done. A girl or young man fixes a leaf-wrapped resin torch in the cleft end of a forked branch that stands on the floor and serves as the native candelabrum. The torch is



A scarf worn over the right shoulder and under the left arm as a hammock in which a child is carried on the mother's hip. This particular specimen is of fine old embroidery, now almost a lost art among the Bagobo



The Bagobo man's carrying bag is worn on the back to carry flint and tinder case, betel nuts, food and tobacco. It is heavily beaded and each of the many small bells is hand made from a wax mold

lighted; promptly the room is filled with pungent smoke that sets a foreign eye to weeping, but the native woman, better adapted, sits stitching, completely absorbed, close to the torch that flares fitfully in the mountain wind coming in gusts through openings in the palm wall. Presently the flame flickers low until someone pulls down the edges of the green leaf envelope to expose a fresh surface of burning resin to the air. A girl ambitious to finish a new *camisa* will crouch in that dim light, cutting out tiny appliqué points and sewing them on, from six o'clock until after midnight, while the rest of the family and the guests are asleep on the floor in the same room.

Yet, with all the sordid discomforts, there is an atmosphere of restful content in a Bagobo house. The members of a family group do their work with an air of leisurely satisfaction; they take time to gaze with keen interest on one another's activities, as the men mold wax for the brass castings, make incised patterns in hard wood, or dexterously twist vegetable fibres into leglets, while the women are skeining hemp, whirling clay pots into form, or pounding rice with an accompaniment of dance and song. And of course everybody is chewing betel nut. The whole picture

of industries and arts seems to grow out of the natural background, as much as the waving bamboos or the rustling hemp fields.

The culture of the Bagobo is largely based on bamboo, *abaca* and betel nut. Houses, rice boxes, water flasks, musical instruments are made of bamboo; the *abaca* fibre clothes the Bagobo; and betel nut is indispensable as stimulus, diversion, luxury, as well as the *sine qua non* for every form of social function and ritual ceremony. Decorative art also developed along the lines suggested by the natural products of the environment. The Bagobo, gifted by nature with a sensitive and artistic temperament, met the appeal of the environment with a swift response. But not only the physical

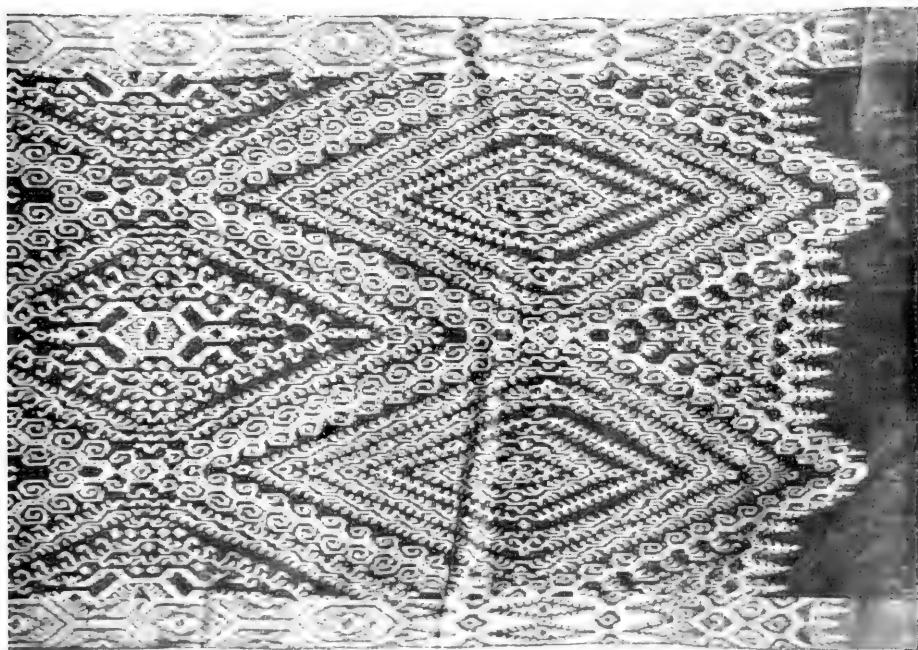


One is playing on the Bagobo woman's guitar while the other steps forth to dance. The photograph is reproduced to show particularly the figured stiff hemp skirts and the manner of wearing them





Hemp fibre as stripped from the stalk of the hemp plant; hemp fibre laced and tied in sections ready to dye; and dyed fibre with binding threads removed revealing the undyed portions. Each Bagobo woman learns from her mother and grandmother the different ways of tying which produce the different patterns in the weaving



A choice textile intended for the middle strip of a woman's skirt. The patterns were tied in the hemp fibre before dyeing and before weaving; the figures are in black and white with a border in miniature figures of red and white

factors of soil and altitude, sunshine and moisture, not only the hereditary tendencies of the Bagobo had a share in producing their rich and varied arts: another contributing element was the simple standard of living that satisfied them and thus left them free to follow their aesthetic interests. When one can step out, cut down a bamboo tree, split it lengthwise, and tie together the sections with rattan to make the house floor, and then sew palm leaves in lengths for the wall; when the furniture of that house consists of a loom, a family altar, a hen's nest, and three stones for a stove — then, other things being equal, there may come about an economic situation in which the whole tribe becomes a leisure class, to the extent that although everybody has to work yet every woman and every man has time to give play to artistic impulses. There, grouped in their mountain villages, fairly isolated from the conquests of Islam, merely grazed by Spanish civilization, the Bagobo people evolved their culture: they worked and played and worshipped and created beauty in rhythmic response to their environment — on, through the long centuries, until the shock of the American occupation changed their life, when the demands of labor set up strange standards of conduct, when the breaking up of mountain homes made havoc of arts and customs which had so slowly and so harmoniously developed.

Yet even now some excellent handiwork is done. The arts of the women — basketry, weaving, dyeing — hold their ground the longest. Particularly in weaving, where the Bagobo woman has attained a high skill in technique, there she continues to produce the classic patterns that she learned from her mother and from her grandmother. From time out of mind men stripped hemp, and women wove it into skirts and jackets and trousers. The Bagobo songs and ancient tales contain many references to the work of the weaver and to the beautiful textiles. In southern Mindanao the hemp industry grew up naturally enough: nowhere in the world is there a climate better fitted to the needs of hemp, for there is continued warmth without excessive heat, and gentle daily showers furnish a natural irrigation throughout the entire year. That decorative art should have found its fullest expression in the products of the loom does not seem remarkable to anyone who looks at the freshly stripped fibre from the stalk of the hemp — creamy-white, glistening, strong, pliable; the mere handling makes the manual process a pleasure, and stimulates the woman artist to experiment with this or that new motive.

The more complex figures are made by tying the warp before the weaving. The hemp fibre is stretched on a long frame of bamboo, and then to make her pattern the woman artist picks out a cluster of strands at varying intervals: four strands here, seven there, two groups of strands near together, two others widely separated, and each cluster she binds and knots with short

lengths of hemp. She binds and ties these clusters so tightly and firmly that when the whole warp is afterward dyed no color can penetrate to the parts thus tied; these sections of the warp remain the natural creamy tint of the hemp. By this method a much wider freedom in design is secured than if the patterns were all made in the weaving itself.

The loom is the center of interest in every household, and its patterns tend to dominate the designs used in much of the wood carving and basketry. In the patterns on burden baskets the designs used in hemp textiles regularly appear: the surface of the basket is uniformly divided into three parallel fields running around the basket, like the three circular strips composing a



"Burden basket" to be carried on the back. In such a basket Bagobo women bring in the corn and potatoes from the field. The pattern is made by plaiting the rattan of natural color with that blackened with the burnt end of a resin torch.

woman's skirt, and the standard designs of the skirt are reproduced with more or less accuracy in the corresponding sections of the basket, as far as the technique of the material permits. This tendency to seize upon textile motives for effects in rattan by no means implies that the art of weaving is necessarily older than the art of basketry. Among the Bagobo it is possible that both processes had their beginnings at nearly the same time. But early or late in the history of Bagobo art, the activity interests that cluster round the loom gave a strong stimulus to such an interpretation of basketry figures, as the familiar patterns of the weaver suggested.



Caliph came to America from the Nile when four years old. He was bought when about twenty years old (1888) by the Central Park menagerie for \$6,000



Caliph died in 1908. He weighed between four and five tons, being the largest hippo ever recorded. The stretch of his open mouth was four feet nine inches

**SOME WORK ON AFRICAN LARGE GAME BY AN ANIMAL SCULPTOR**

TWO pieces of museum work completed some months ago have not heretofore received notice in the JOURNAL. They are a zebra group and a mount of Caliph, the hippo known for many years at Central Park. This work, a part of a series planned to cover the large game of



The sculptor made sketch models in clay from the Grant zebras at the New York Zoological Park preparatory to the work of mounting the Museum's Zebra Group



The coat of the Grant zebra is peculiarly rich in color and lustre. As the work on the model progresses, following the exact measurements made in the field, the skin is fitted over the clay at intervals to insure exact fidelity to the proportions of the original living zebra.

Africa, has been done by Mr. Frederick Blaschke, who had training as a sculptor at Budapest under Professor Strobl, at Berlin in the Academy of Science, at Paris under Rodin and at Munich in the Academy of Drawing. The modeling and mounting of the hippo involved technical difficulties in the giant size of the animal and in the character of the skin adapted to water life, and the result is remarkable as an example of the application of modeling to the taxidermy work of a museum. The Zebra Group, representing a family of the Grant zebra, is a quiet but vigorous composition and shows Mr. Blaschke's skill in handling technique and his ability to interpret animal life.

The work of a sculptor in a museum of natural history must stand for scientific truth, for accurate presentation — not of a few details, but of every detail. In this it differs from the work of an animal sculptor in art, where detail may be wholly subordinated to action or character. In animal sculpture for science however, it would be unfortunate if the art ideal of showing the essential spirit of an animal were lacking, most fortunate if the sculptor combined with his power of accuracy an appreciation and sympathy which would give him ability to see life from the given animal's standpoint and to set forth convincingly in spite of the intrusion of details the impression in his mind.

To use one of the examples at hand, a zebra must stand before the Museum's visiting public as a representative of a given genus and species, and it may be mounted to show haunt and typical habits; but there will be no confusion as to its scientific status if in addition to technical accuracy the work be done to give an understanding of this animal's characteristic timidity and nervous activity, and thus the finer conception of the zebra living be set forth and the strong human interest of a work of art realized. This conception is rather well achieved in the present zebra group notwithstanding that the group represents a composition of animals in repose. The group stands against the walls of the African Hall with no habitat constructed about it, yet there is so much alertness in the lines of the tense muscles of the male zebra that the suggestion is vividly apparent, to one who knows anything of wild African life, that this zebra is looking out over reaches of African country, alive to the possibility of an enemy's approach.

A new era for the natural history museum came when the taxidermy method gave way to the careful delineation of the sculptor. It is likely that this change marks only the beginning of a new era however, the work having very large possibilities in an age when animal sculpture is at the highest level yet gained in its history. Hence it is, that unusual interest will attach to work done in this line during the immediate future, especially



*The clay model of Caliph.* Making the model is the test of the sculptor's power of accurate work. It is based on studies of living hippos, previous measurements of the animal to be mounted, exact proportions gained from the skeleton, and on a knowledge of anatomy which will allow a modeling of the surface to suggest the living muscles underneath



*Working on a plaster "piece mold" of the clay model* Mr. J. C. Bell is a member of the staff of the Museum's Department of Preparation and is at present on the Oceanographic Expedition under Dr. Charles H. Townsend in the Pacific, making a series of plaster and glue molds of deep sea fishes and invertebrates





*A portion of the piece mold with clay model removed. This has on its interior, of course, a perfect impression of the hippo model, and will give a positive or cast of this impression to soft plaster placed against the interior. The mold of the hippo was thirteen feet long*



*The plaster cast, or manikin, partly uncovered as the piece mold is being removed. The cast is hollow, requisite strength being gained by the introduction of burlap into the plaster before it sets*

with the Museum's plans in hand for okapi, white rhinoceros, elephant and still other mammal groups. No ability can prove too great to bring to the work, no training too thorough, no understanding of animal life too



CALIPH, THEIR OLD FRIEND, AT THE MUSEUM

The great hippo skin, weighing 1200 pounds, was shaved down to 68 pounds, and placed over the plaster manikin, the two fitting together in every wrinkle and fold

profound. In fact, the highest standard for the work is made imperative by the need of an adequate and permanent record of the world's large game, much of which is destined to become extinct.

## THE CROW INDIANS OF MONTANA

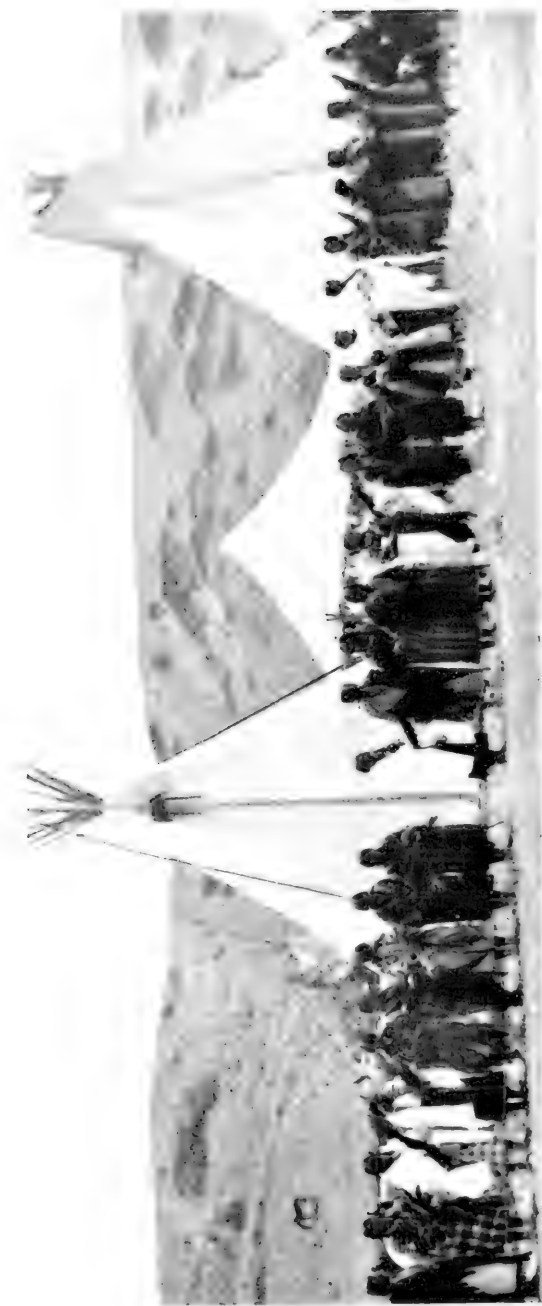
*By Robert H. Lowie*

THE Crow Reservation has been for years the Mecca of innumerable white visitors who make pilgrimages to the historic site of the Custer Battle Field, a short distance from Crow Agency, or who paint or photograph the Indians. Nevertheless, this splendid people, whose lofty bearing and gorgeous dress were the admiration of the early explorers of the Plains, have preserved to a considerable extent the spirit of the old times and prove an endless source of delight to the visiting ethnologist.

Foremost among the religious observances of the Crow is the Tobacco Dance. This is not a single dance, but a cycle of beautiful and impressive performances beginning in the early spring when the seeds of the tobacco are sown and terminating with the gathering in of the crop. The plant thus cultivated is raised exclusively for its religious value, and is so highly prized that the Crow are willing to purchase a small bag of seeds at the price of a horse. Only duly adopted members of the several Tobacco societies are permitted to plant seeds in the Tobacco garden, where each society occupies a clearly defined plot and each couple initiated may drop seeds in two rows.

I was fortunate enough to witness an adoption ceremony held by one of the Tobacco societies. The members of the society together with the candidate to be adopted met in a tipi for the preparatory painting and singing. Here there were many songs and at each song the women rose, unwrapped their sacred bundles and danced. When, with much ceremony, the preparations were completed, all marched toward the adoption lodge, four stops being made on the way, in accordance with the sacred number of this people. On entering the large canvas-covered lodge, the drummers sat down at one side of an altar-like structure symbolizing the Tobacco garden. Continually during the formal and impressive ceremony, small groups of women, or more rarely of men, with their eagle-feather fans, sacred birds' head decorations, and weasel or otter skins, rose and gently swayed their bodies and moved their arms rhythmically back and forth. Toward noon the friends of the candidate heaped up blankets and other property in his behalf, as a payment to his adoptive "parent," as the person initiating him is called. By way of actual initiation of the candidate he was taken between two men standing at the foot of the altar and danced four dances with them, at the same time learning the songs. It was late in the afternoon when the closing song was chanted, after which all members seized little green sprigs and raised them aloft to symbolize and to promote the growth of the sacred Tobacco.

While the Tobacco ceremonies showed the serious side of the native



TOBACCO SOCIETY OF THE CROW INDIANS

On the way to the Adoption Lodge for the initiation of a candidate. Four stops are made according to the sacred number of these Indians while drums are beaten and each individual dances in his place with great ceremony



THE PROCESSION ENTERS THE ADOPTION LODGE

character, the annual performances of the clowns refuted the popular fallacy that the Indians are devoid of humor. A group of men departed from camp and dressed up in the worst possible clothing, blackening their bodies with mud and donning crude masks made of canvas. Also they kidnapped the ugliest horse they could find and enhanced its unattractiveness by trappings of repulsive-looking gunnysack. Then they returned to camp, and amused the spectators, stopping the play abruptly as soon as they were identified.

In following out one of the principal objects of my expedition, that is to collect information on the old military societies of the Crow, I discovered the former existence of a boys' military organization called *buptsake*, formed in imitation of the societies of adults. As an emblem of their dignity these prospective warriors carried tall staffs to which were attached wooden objects resembling bannerstones and covered with symbolical paintings. It was found later that the kindred Hidatsa Indians possess a corresponding society with a similar emblem, which was secured for purposes of comparison.

One of the curious social customs practised by the Crow, as well as by many other Indian tribes, is the "mother-in-law taboo." That is to say, a man is under no circumstances permitted to hold conversation with his wife's mother. Another strange regulation is that relating to the playing of practical jokes. A man is not permitted to jest with anyone he pleases, but is limited to the individuals whose fathers belonged to the same clan as his own father. Within this group, however, practically any liberty is allowable. If a man discovers that a "jokable relative" has committed some foolish or disgraceful act, he can publicly twit him with it, and the person derided must not get angry, but bide his time for some favorable opportunity to retaliate.

The older Crow are justly proud of the fact that they have invariably sided with the Government in the history of Indian warfare, and are eager to have their deeds remembered. For example, Gray Bull, one of the most noted warriors of the tribe, wished me to place on record the fact that he had saved the soldiers under "General Custer's brother" (possibly General Crook) from an attack by the Sioux. Many of the representatives of the younger generation have a very good knowledge of English and show a surprising interest in the affairs of the outside world. Thus one of my Crow friends subscribes for the *Literary Digest*, another was not afraid to struggle with the terminology of a law book in order to get at the meaning of some Indian regulation, and a third showed a vital interest in the elements of civics. These signs of intelligence and mental activity encourage us in the belief that the Crow, who have always taken the part of the United States against hostile tribes, will continue the good work of the past and will be able to contribute their share to the development of their great adoptive country.

## MUSEUM NEWS NOTES

THE following have been elected recently to membership in the Museum:

*Life Members*, MESSRS. GEORGE B. CASE, DANIEL W. CORY, THEODORE DEWITT, NEWBOLD MORRIS, WILLIAM F. PATTERSON, GEORGE P. SHIRAS, PAUL CECIL SPOFFORD, FREDERIC C. WALCOTT, DRS. EVAN M. EVANS and GEORGE H. GIRTY and MRS. HENRY FAIRFIELD OSBORN:

*Annual Members*, MESSRS. EDWARD P. BECKWITH, HERBERT BUCKES, R. P. DOW, K. S. FALK, BERNARD H. FLURSCHEIM, H. A. FLURSCHEIM, JOHN C. HATELY, JOHN W. LOVELAND, MORRIS MAYER, HENRY S. REYNOLDS, WILLIAM J. ROBB, HORATIO S. SIMON, WILLIAM E. WOLFF, DR. WILLIAM HANNA THOMSON, MMES. E. G. JANEWAY and ROSA VETTEL, and MISSES GERTRUDE DODD, LAURA B. GARRETT, ELIZABETH S. HOYT and ELLEN KING.

AT the meeting of the Executive Committee on April 19, the following were elected to membership in the Museum in recognition of recent gifts

*Fellow*, Mr. D. C. Stapleton;

*Life Members*, Mr. F. D. Aller and Miss Frances E. Sprague.

COMMANDER GUY H. BURRAGE, U. S. N., who has coöperated with Acting Director Townsend in carrying out the plans of the Museum's expedition in Lower California, has been made a Life Member in recognition of his services.

SIR JOHN MURRAY, under the auspices of the New York Academy of Sciences and the American Museum, gave an address in the auditorium of the Museum April 24 on the subject "Depths of the Sea." Sir John Murray is world authority on all that pertains to Oceanography, having taken part in the Challenger and other deep sea expeditions. To his inspiration is due the founding of the Oceanographic Museum of Berlin which in turn led to the establishment of the Oceanographic Museum at Monte Carlo and the Oceanographic Institute at Paris. It is hoped that a similar line of work may be carried on in the United States and to this end it has been decided to set aside in the planned extension of the Museum building two halls for the subject of Oceanography and closely allied science.

Two collections of birds have been placed on deposit in the American Museum. One of these, the property of Dr. Jonathan Dwight, Jr., of New York City, numbers about 30,000 specimens, ranking as one of the largest private collections in this country. It is especially valuable in showing

plumages and molts of North American species. The second collection belonging to Dr. Leonard C. Sanford of New Haven, Connecticut, contains about 400 specimens, largely non-passerine birds, and includes rare species especially among the albatrosses and petrels, some of which are not represented in the American Museum collections.

At the meeting of the Executive Committee on April 19, Dr. Louis Hussakof was promoted to the position of Associate Curator of Fishes.

MR. HERBERT LANG, leader of the Museum's Congo Expedition, sends a report from Niangara under date of January 14 with an account of successful work, especially among the Mangbetu. The collections have been greatly increased, gaining twenty-two additional species of mammals, twenty of reptiles and batrachians and sixty of birds since the previous report from Medje. The expedition planned to leave Niangara on January 18 with a caravan of one hundred men, proceeding to Dongu, Foradje and Aba where it was hoped to arrive in early February. The report included a series of photographs which unfortunately arrived too late to find place in the JOURNAL.

THE MUSEUM has issued a *Guide Leaflet* by Dr. C-E. A. Winslow, Curator of Public Health, on the subject "Protection of River and Harbor Waters from Municipal Wastes." This leaflet will be on sale during the exhibition of the Metropolitan Sewerage Commission, postponed from April to the latter part of May, and explains the many models the Department will display at that time.

A habitat group fifteen feet long has been planned to receive the unusually fine specimens of wild boar presented to the Museum by Mr. Walter Winans. The group has been designed by Mr. Frederick Blaschke of the Department of Preparation, who has had experience boar hunting in Germany.

THE MUSEUM has recently purchased a skin and skeleton of the buffalo of Mindoro Island, *Anoa mindorensis* Steere, called by the natives "tamarau." There are few specimens of this buffalo in American and European museums, for although abundant in Mindoro, the animal is rarely taken because confined to dense jungle and fierce under attack. A "tamarau" skull was secured for the Museum by Mr. Roy C. Andrews while in the Philippines. The new specimens come through the efforts of Mr. A. L. Day of Manila.

THE Guide Leaflet Series of the Museum has been increased by a pamphlet of one-hundred pages issued by the Department of Woods and Forestry and based on the Jesup Collection of Woods. While primarily dealing with tree structure and growth and containing a planting guide for thirty-four of the most valuable trees of North America, this leaflet has been made to cover briefly a wide field in the practical aspects of forests and forest industries in order not to lack in suggestiveness along the various lines of interest of the Museum's visitors.

THREE very important anthropological collections have been purchased. One from the Jesup Fund, is a series of rare objects from the Tsimshian Indians of the North Pacific Coast collected by Lieutenant G. T. Emmons. This fills practically the only gap in our series from that important culture area.

The second collection, made by Dr. Carl Lumholtz, in the little-known borderland along the Mexican boundary of Arizona, was purchased from the Primitive Peoples of the Southwest Fund. Among the unusual pieces in this collection are the costumes of a fool dancer, consisting of a mask, a crude and useless bow and other absurd trappings. This is of especial interest since this ceremonial character seems to connect the Papago culture with that of the Plains. Among other things may be mentioned a series of wooden plows introduced into Mexico from Europe by the early Spanish explorers. The Papago are the southern representatives of the Pima stock and were found still practising the art of basketry for which the Pima proper were at one time famous. The collection contains excellent samples of this almost extinct textile art.

The third acquisition, gained through the Jesup Fund, is the General U. S. Hollister collection of Navajo blankets. In this series there are sixty-six pieces, some made before 1850. In materials and dyes there is a full representation: eleven blankets of bayeta, one of natural wool, eight of native dyes, seven of Germantown yarn, twelve of other commercial yarn, and eighteen in aniline dyes. The four varieties of weave practised by the Navajo are fully represented. There are also a few exceptional blankets, one of which represents in its design the Corn God copied from the sand paintings of altars of the Navajo. This collection, jointly with the series recently presented by Mrs. Sage and those belonging to the Lenders and Tefft collections recently presented by Mr. Morgan, give us a series of Navajo textiles fully representative both as to technique and design.



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# THE AMERICAN MUSEUM JOURNAL



A SMALL SECTION OF THE BULLFROG GROUP

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Number 6

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THE AMERICAN MUSEUM OF NATURAL HISTORY was established in 1869 to promote the Natural Sciences and to diffuse a general knowledge of them among the people, and it is in cordial coöperation with all similar institutions throughout the world. The Museum authorities are dependent upon private subscriptions and the dues from members for procuring needed additions to the collections and for carrying on explorations in America and other parts of the world. The membership fees are,

Annual Members.....	\$ 10	Fellows.....	\$ 500
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THE MUSEUM LIBRARY contains more than 60,000 volumes with a good working collection of publications issued by scientific institutions and societies in this country and abroad. The library is open to the public for reference daily — Sundays and holidays excepted — from 9 A. M. to 5 P. M.

THE MUSEUM PUBLICATIONS are issued in six series: The American Museum Journal, Annual Report, Anthropological Papers, Bulletins, Guide Leaflets and Memoirs. Information concerning their sale may be obtained at the Museum Library.

GUIDES FOR STUDY OF EXHIBITS are provided on request by the Department of Public Education. Teachers wishing to bring classes should write or telephone the Department for an appointment, specifying the collection to be studied. Lectures to classes may also be arranged for. In all cases the best results are obtained with small groups of children.

WORKROOMS AND STORAGE COLLECTIONS may be visited by persons presenting membership tickets. The storage collections are open to all persons desiring to examine specimens for special study. Applications should be made at the information desk.

THE MITLA RESTAURANT in the east basement is reached by the elevator and is open from 12 to 5 on all days except Sundays. Afternoon Tea is served from 2 to 5. The Mitla Room is of unusual interest as an exhibition hall being an exact reproduction of temple ruins at Mitla, Mexico.

# The American Museum Journal

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Act of Congress, July 16, 1894



A new group installed in the east tower of the second floor, showing some of the activities of the common bullfrog (*Rana catesbeiana*) Southern New England, July.

Transparent background painted by Hobart Nichols and Albert Opert; frogs cast in wax and colored by Dwight Franklin; accessories made by various assistants in the Department of Preparation and Installation; group assembled by Ernest Smith; work planned and supervised by M. C. Dickerson, Assistant Curator of Herpetology

# The American Museum Journal

VOL. XI

OCTOBER, 1911

No. 6

## A NOTE REGARDING HUMAN INTEREST IN MUSEUM EXHIBITS

*By Frederic A. Lucas*

IT was a favorite saying of Dr. Goode of the National Museum that in preparing any museum exhibit it was of the utmost importance to keep in mind its human interest—to show, if possible, its direct relation to mankind in general and to the individual observer in particular. Dr. Goode was quite right. We may like to see strange and curious objects, but we like them all the better if there is something about them with which we are slightly familiar; in truth, to find something in a museum exhibit with which we are personally and pleasantly familiar is like recognizing the face of a friendly acquaintance in a strange city.

The purpose of arousing personal human interest is the keynote of the exhibits of the modern museum. The museum of fifty years ago, or even less, was devoted to the exhibition of objects. The task of the modern museum is to display ideas and to teach important facts, and one of the best means to this end is to show something more or less familiar in order to arouse interest and stimulate a desire to know more about the subject.

In the old type of museum a bird was shown as a specimen of a particular species, with no idea of anything beyond. Of course the purpose of mere record still exists, but whenever possible something more is done—the relation of the bird to others is given, its whole life is shown, the manner in which it is or has been influenced by its surroundings, and the part it plays in the general economy of nature and directly toward man.

The value of this human interest as an attractive force is shown in the universal attention given to those exhibits in which Man or his works form a part, or in which he is concerned. Examples of this are the series in the United States National Museum where the skeleton of Man is compared with the skeletons of the great apes; or the collection in the Brooklyn Institute Museum, which treats of Man as a member of the order *Primates* and which calls attention to some of the points in which he resembles or differs from other members of the order. This exhibit is extremely popular and on days when the attendance is good is surrounded by visitors whose interest shows that Pope knew whereof he spoke when he wrote that the "proper study of mankind is man."

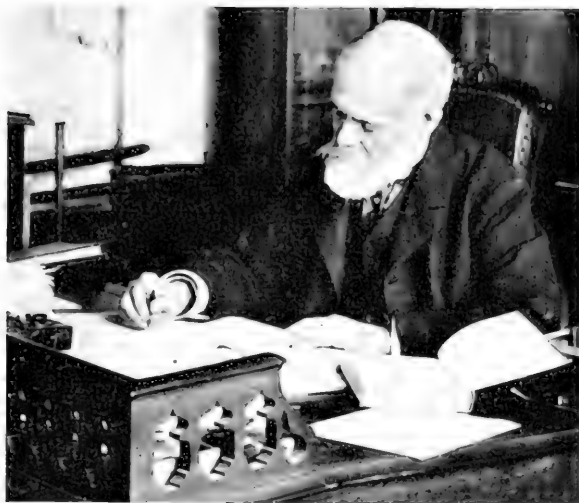
It is a curious fact that models of scenes illustrating the occupations of savage or little-known races of men apparently arouse greater interest when in miniature, attracting more attention than full-size reproductions. This is true partly because in the small group the whole scene can be grasped at once as in a picture, but especially because of human interest lent the exhibit by the fact that we know some one wrought the entire work — figures, landscape and all. It is this latter that explains in part the interest taken in the Habitat Groups of Birds, which is due not merely to the skillful reproduction of nature but to the fact that it is a reproduction, that waving branches and jagged rocks have been deftly imitated by the hand of man. The admiration of the observer is not entirely for the group; a part goes to the brain that devised it and to the hand that wrought it.

A museum may display pigeons or fowl as examples of variation under domestication, but the average visitor sees them merely as birds with which he has an actual acquaintance and in which he is personally interested. He probably has not the least idea of the origin of our domesticated birds, he has never given the matter a thought, but the chances are that out of many observers a few will have their interest aroused, note the fact that in one case the rock pigeon and in the other the jungle fowl is the original stock from which our multifarious birds have been derived, and come to realize that what man has done rapidly on a small scale, Nature has been doing slowly on a grand scale ever since life originated on this planet of ours. Incidentally he may be led to reflect on the work of Darwin and others in formulating and expounding the theory of evolution. Here are apparent the direct human interest and the manner in which the casual visitor is led by something with which he is acquainted to something which he has never considered.

In other cases the road is not so evident, but there is generally some point of contact between visitor and object. The problem for the museum is to find this point of contact. A foraminifer is a very abstract thing to most people, but a piece of nummulitic limestone, of which the pyramids are built, or a bit of chalk supplies the human interest and puts the visitor in touch, very lightly though it be, with the simpler forms of life, suggesting the part they play in everyday life and the direct concern he may have in these apparently insignificant creatures.

It may be granted that the necessary human touch is not to be found in each and every object in a science museum — as perhaps is likely to be the case in a museum of history or art — or in every part of an exhibit, although it may be present in the exhibit as a whole. The point that the museum bears in mind is, that whenever possible, some link between the facts of the exhibit and the interests and experiences of the observers must be brought forward and emphasized.





### A GIFT OF PECULIAR VALUE

PRESENTED BY PROFESSOR ALBERT S. BICKMORE, WHO HAS DEVOTED THIRTY-SIX YEARS TO EDUCATIONAL WORK FOR THE AMERICAN MUSEUM

*By George H. Sherwood*

ONE of the most valuable and important acquisitions that the Museum has recently received is the personal library and superb collection of lantern slides of Professor Albert S. Bickmore, the organizer and first Curator of the Department of Public Education. These are presented jointly by Professor Bickmore and his wife, Charlotte B. Bickmore. The collection comprises more than twenty thousand lantern slides of which more than twelve thousand are colored. They were acquired by Professor Bickmore during his connection with the State Department of Education and represent the results of his extensive travels. In view of the loss, in the disastrous capitol fire at Albany last winter, not only of the original negatives but also of the supply of lantern slides owned by the State, this collection of slides, which has now no duplicate, is become greatly increased in value.

For many years Professor Bickmore gave at the American Museum lectures to the school teachers of the city and his office was always a rendezvous for teachers, where they were at liberty to consult his library and study the slides at their leisure. More recently his slides have been extensively used in lectures to school children, which have annually been given at the Museum for the purpose of supplementing the class room work in geography and history, and now that the whole series of slides has been made available, these lectures will be unusually instructive and broad in scope.



Mangbetu archers as arranged during a sham battle



After a sham battle. Okondo the King in the center with the light-colored shield



## NEWS OF THE CONGO EXPEDITION

From the report of Herbert Lang, Leader

**T**HE Congo Expedition has been unusually successful in its work among the Mangbetu and has emphasized considerably thereby its record in anthropology.

The Mangbetu possess intelligence unwonted among Africans and the Mangbetu monarchy, first described in 1870, is very ancient, probably founded several hundred years ago by Hamitic wanderers from the Nile. Industry has flourished in this monarchy, the Mangbetu excelling in pottery, carving and boat building, while according to some authorities their houses are superior to all others in Central Africa.

Okondo, the present king, has extended very great favor to the Museum's expedition and has arranged many palavers, dances, sham battles and other performances for its study. He has granted that photographs be taken of the King's village of one hundred huts, each with its paintings and carvings, of his own "big hut," and also of his three queens, in whose royal dress figure rare okapi belts, many ornaments of brass, and elaborate headdresses decorated with monkey bones.

The collection in anthropology now consists of some 1400 articles and in the words of Mr. Lang, "... is unique not only on account of its numbers but especially by reason of the selection that has been made throughout practically the entire territory inhabited by the Mangbetu and tribes intimately mingled with them."

The expedition has visited Doagu, Faradje and Aba, traveling with a caravan of one hundred and eighty men, which fact in itself explains the large size of the collections. In the report 2400 mammals are listed, 1300 reptiles and 2850 birds. Among the mammals is a fine bull white rhinoceros, two elephants, a bull black rhinoceros and two buffaloes.

## THE MAKING OF POTTERY AT SAN ILDEFONSO

*By Herbert J. Spinden*

THE Pueblo Indians of New Mexico and Arizona have been subjected almost constantly to strong European influence since the memorable expedition of Coronado in 1540, yet they probably retain a larger proportion of purely native habits of life than any other group of Indians in the United States. To be sure their numbers have dwindled pitifully. Only a few of the prosperous villages that the Spanish explorers found in the valley of the Rio Grande and elsewhere in the Southwest have survived till our time. But their great communal dwellings, their dress, and their household arts are still distinctive. Among the western members the ancient religion and social organization still hold sway as may be seen by the famous Snake Dance of the Moki, and in the valley of the Rio Grande many old time religious and social customs exist under a thin veneer of

Christianity. Needless to say, however, the commercializing American contact is rapidly destroying the remains of the native culture.

The pueblo of San Ildefonso is beautifully situated on the east bank of the Rio Grande about twenty miles northwest of Santa Fe. To the east rise the lofty peaks that mark the southern termination of the Sangre de Cristo Range, while on the opposite side are seen the timbered heights of the Jemez Mountains. The foothills on either hand present arid stretches of reddish soil tufted with dwarfed cedar and other desert shrubs. The river, bordered by cottonwood



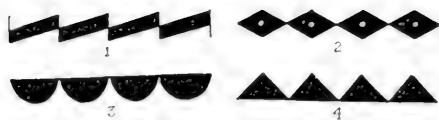
Ceremonial bowl, used to hold sacred meal. On the inside, under the terraced rim, are two water snakes above domed clouds from which descends a stream of water upon terraced mountains. At either side are great horned snakes upon a starry field. The bottom of the bowl represents a circular valley surrounded by mountains from which issue streams. In the valley is a lake, abounding with ducks. Similar figures are shown on the outside of the bowl. Other ceremonial bowls frequently show the sacred chiffonetti dancers and miraculous animals such as the bear and mountain lion



Black and white storage jar made by Indians of San Ildefonso, New Mexico. The decoration differs on all four sides, and consists of rainbows, rainstorms and vegetation.



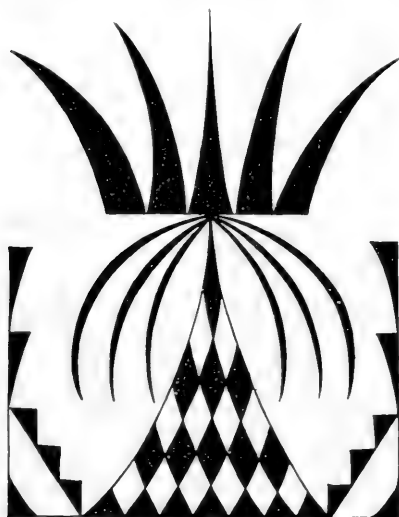
Black and white storage jar. At the right, jagged lightning; at the left, a terraced cloud (placed on edge with the top projecting inward) swollen with rain as indicated by the crossed lines



Even small geometric motives have a realistic interpretation as well as a descriptive term: 1 — rafters, or sloping lines; 2 — slings or diamonds; 3 — little clouds or scallops; 4 — little hills or sharp points



Symbolic of the rainbow. Upper diamonds are scattering rain clouds; below, the cloud rack with rainbow more or less broken and fringed with light; under the rainbow the open sky, a mass of white cumulus clouds appearing above the horizon which runs out at either end into mysterious distance. Lower horizontal line the level ground, under it roots benefited by the down-pour; from center of ground-line springs a flower sequel of the rain



Swampy margin of a lake. In diamonded area white represents water, black land. Border of the lake at either side in the form of the ever-recurring terrace or zigzag with its mysterious suggestion of clouds, mountains and human aspiration. At the top the cat-tail rush with long roots growing downward into the deep water

trees, spreads out in a maze of channels. Between it and the town are the cornfields divided irregularly by hedges of wild plums and sunflowers that follow the courses of the irrigation ditches. To the north is seen the Black Mesa, an isolated flat-topped hill perhaps six hundred feet in height that stands in the middle of the valley. The vertical escarpments of black lava resemble the bastions of a fort. On the summit of this hill the natives of San Ildefonso maintained themselves against the besieging Spanish soldiers during the rebellion of 1680.

Several kinds of pottery are still manufactured at San Ildefonso. In particular the pueblo is famous for water jars and large storage vessels with conventionalized designs in red and black upon a cream-colored base. Red base pottery with designs in black, polished black pottery and rough cooking ware are also made.

The processes of pottery manufacture are about the same in all the Rio Grande pueblos but the materials, such as clays and paints, vary from village to village, as do also the styles of decoration. The typical wares of each pueblo are, as a rule, easily recognized. The vessels are built up by hand from hollowed out lumps of



San Ildefonso water jars. The design on the jar at the left shows a spring set in a valley between hills. In the centre is the water dotted with floating duckweed. On all sides are flowering water plants

The second vessel gives to the Pueblo a picture of summer time. White fleecy clouds that float high in the sky are about the neck of the jar; beneath are rain clouds heavy with water, and lower still are blossoming wako plants and humming birds are hovering about



At the left a fine San Ildefonso bowl decorated with red and black designs representing highly conventionalized flowers

The water jar at the right is decorated with floral patterns executed in more realistic manner

clay to which rings of fresh clay are added as the height is increased. The shaping is done by the fingers, which must be dipped frequently in water during the process. The walls of the pots are made thin and even by gourd scrapers. After the pots are dry their outer surfaces are polished with smooth stones, then a sizing of fine clay is added and the process of polishing repeated. After this the designs are painted on with a brush made from a yucca leaf. The kiln is constructed in the open air. A fire is laid and over it the pots are piled in inverted positions, the rims resting on stones or on lumps of clay. More fuel, consisting of slabs of dry manure, is then arranged around the jars, great care being taken to see that none of the fuel actually touches the sides of the vessels. The draft must be kept open or the ware will be blackened. All painted pottery and all polished red pottery is burned in an open draft fire. In the case of the polished black pottery however, after the open fire has been started, it is smothered by several shovelfuls of fine dust-like manure that drives in the smoke and blackens the red wash or sizing. It is hard to realize that the sole difference between the brilliant red ware and the gleaming black is merely a trick in burning.

At San Ildefonso the finest pottery has designs in black on a whitish background. The black paint is made by boiling down the leaves and stems of the wako weed or Rocky Mountain bee balm. This makes a dark brown syrup which becomes a very smooth jet black after burning. Red ochre is commonly used for red paint, while orange paint appears very rarely on San Ildefonso pottery.

Most of the designs on Pueblo pottery seem quite unintelligible to us, yet to the makers they signify definite and important things. The Pueblo Indians of San Ildefonso, and of the Southwest in general, have a keen appreciation of nature which shows in every feature of their decorative art. Living an agricultural life in a semi-arid environment, rain is to them the great necessity of existence. Clouds, falling rain, flashing lightning, brimming rivers and flooded fields — these are the aspects of nature that please them most. The formal figures in which they embody their conceptions of propitious nature are intended to appeal to the imagination and to please the eye. These figures are manipulated as motives of pure design without losing a bit of their realistic intention. There is also a religious significance in many of the figures painted on the pottery. Primitive people very often represent by means of drawings or dramas what they consider to be desirable things so that they will be more certain to occur. Even the small geometric motives used in narrow bands have a realistic interpretation, although there is usually a descriptive term as well, while the more elaborate designs often disclose strikingly realistic conceptions notwithstanding the formal presentation.

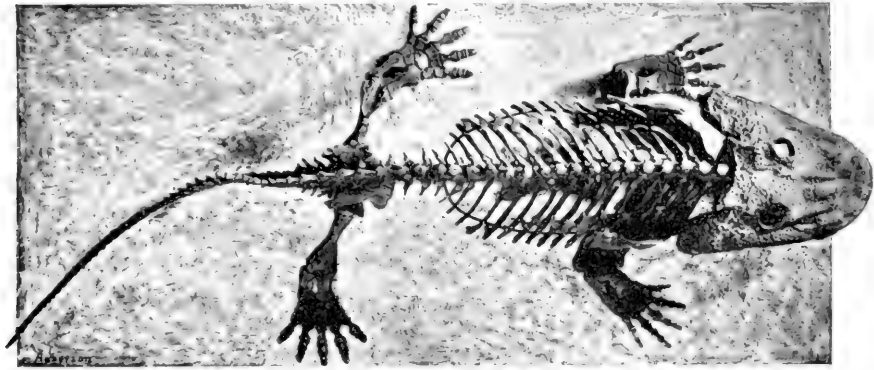


## THE AMPHIBIANS OF THE GREAT COAL SWAMPS

By W. D. Matthew

The kind of animals that inhabited the ancient forest-swamps where the great coal formations of the world were laid down is shown by the skeleton of the primitive amphibian *Eryops*, now on exhibition in the Hall of Fossil Reptiles.

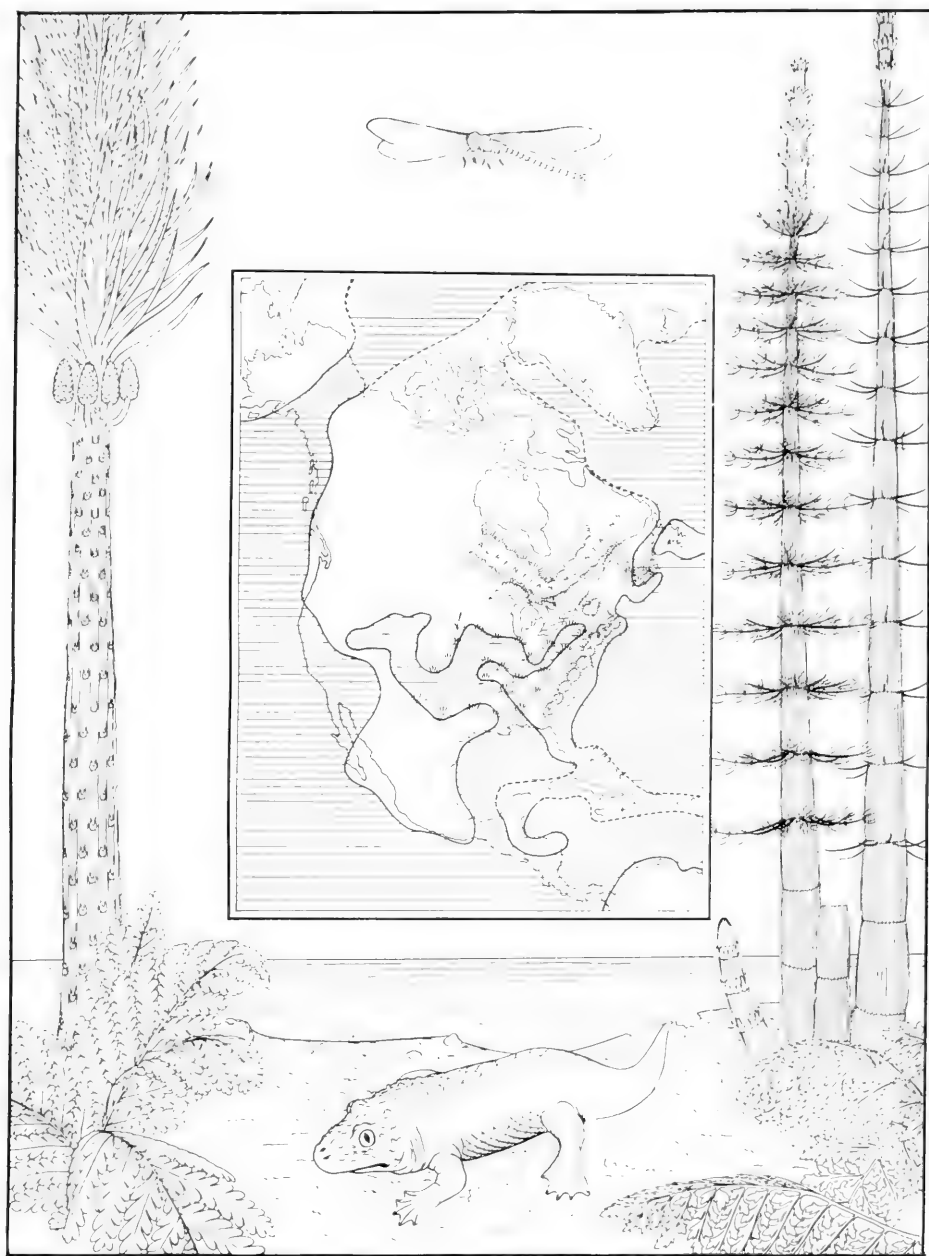
THE Coal Era has more practical importance to civilized man than any other period of the past. Coal is the most important mineral product of the world; to a very considerable extent it may be said to be the material basis of our present-day civilization. If for no other reason than this, the Carboniferous Period, when most of the world's coal beds were being formed, ought to be of especial interest to everyone. But



*Eryops* from the Lower Permian of Texas. An ancient amphibian which lived about the close of the Coal Era, many million years ago. It is twice as old as the *Brontosaurus* five times as old as the *Eohippus*, a hundred times as old as the mammoth or mastodon or the earliest known remains of man.

to all who are likewise interested in the past history of the earth, in the extinct races of animals and plants which have formerly inhabited it, in the evolution of those which now exist, the Coal Era has a broader interest. For the antique world of this remote period, many millions of years ago, was widely different in its appearance, in the outlines of its continents, in the character of its plants and animals, from the present day. There were no broad-leaved trees nor flowering plants, no birds nor mammals nor any of the higher kinds of insects. The swamp vegetation was chiefly ferns and fern-like plants and giant relatives of the modern equisetums and club mosses, while coniferous trees grew in the uplands. The insects were all of the lower orders, dragon flies, cockroaches, millipedes, and others; no bees, no ants, no butterflies nor beetles.

The land vertebrates were, at this ancient period, in the early stages of their adaptation to terrestrial life. Like the modern efts and salamanders



NORTH AMERICAN GEOGRAPHY AT CLOSE OF COAL ERA

The outlines of land and water are slightly modified from the map by Professor Schuchert. The border shows characteristic vegetation of that epoch, partly conventionalized; to the left, *Sigillaria*, *Neuropteris*, to right *Calamites*, *Sphenopteris*. Below is a sketch restoration of *Eryops*, and above, one of the giant "dragon flies," *Meganeura*

"The dragon fly that darted over the head of the slow-crawling *Eryops* might seem, except in size, . . . a far more promising candidate for the position of ancestor to the intelligent life which was to appear in the dim future"

they were amphibious animals, half reptile, half fish, in appearance and habits.

Living amphibia are the survivors more or less altered of the kind of animal which in the Coal Era was the highest form of animal life. The study of the structure and development of the higher vertebrates — of reptiles, birds and mammals — has shown that they must be derived from animals of this type, and the successive stages in their evolution are illustrated by the fossil vertebrates of the successive periods of geological history. In the Carboniferous the amphibians were the dominant type, and the reptiles were just beginning to evolve from them, becoming adapted to a more strictly terrestrial life. These earliest reptiles are very close to the primitive amphibians, and the wide gap that now separates these two classes of vertebrates was then so slight that it is difficult to draw any separating line between them.

Most of the primitive amphibians are so small and their skeletons so crushed and imperfect that they cannot very easily be studied except by specialists. A few of them however, the giants of their day, are of fairly large size, and well preserved skeletons have been found in the "red beds" which immediately overlie the coal formation of Texas and are of somewhat later age (Lower Permian) than the true coal measures. *Eryops* is the largest and best known of these Permian amphibians in America. Its bones have been found in the upper coal measures of Pennsylvania but the best skeletons are from the Texas red beds.

Here then is the type of animal that lorded it over the denizens of the gloomy forests and dark morasses of the Coal Period: a sort of gigantic tadpole or mud puppy, with wide flat head, no neck, a thick heavy body, short legs and paddle-like feet and a heavy flattened tail. While able to crawl clumsily and slowly upon the land, he must have been far more at home in the water, living in the dead pools and backwaters and slow-moving streams that traversed the far extended coast-marshes of the great interior sea to the west of the Appalachian highlands.

That this beast, slow, heavy and clumsy, small brained and low organized, should be one of the highest types of living beings in his time, may help to realize how remote and far away was the era of the Coal Forests. That he is a collateral ancestor of all the higher animals — of reptiles, birds, mammals and of man himself — all evolved through the millions of years which have since elapsed from animals of the same type and grade of organization, may serve at least to raise our respect for the possibilities of development which lay in the primitive amphibia. The giant dragon fly that darted over the head of the slow-crawling *Eryops* might seem, except in size, a far superior type of being, a far more promising candidate for the

position of ancestor to the intelligent life which was to appear in the dim future. But the insect had fulfilled the mechanical possibilities of which his structural organization was capable. The future progress of the insect type was to lie not in the direction of a more perfect mechanism, but in the perfection of the metamorphosis during the growth of the individual and in the establishment of elaborate social organizations and instincts.

The amphibian was but beginning the adaptation of the vertebrate structure to a terrestrial habitat and in his organization lay concealed a potential evolution to a far higher plane of existence than the insect organization has been able to reach. It is not so easy to say just wherein this superiority lay, but probably the possession of an internal instead of an external skeleton was an essential feature of it. The late Professor Shaler<sup>1</sup> has pointed out the advantages of an internal as against an external skeleton in stimulating more intelligent and less blindly instinctive activities in the evolution of animal life. The internal skeleton has also certain marked mechanical advantages in permitting the attainment of a much larger size in the animals possessing it, as may easily be seen by comparing the maximum size attained in one or the other type of organization under the same conditions of life.

**"REVEALING AND CONCEALING COLORATION IN BIRDS  
AND MAMMALS" BY THEODORE ROOSEVELT**

**T**HIS book, published by the Museum in August is well worth reading by all interested in the subject of animal coloration. The more than one hundred pages present a critical review of Thayer's *Concealing Coloration in the Animal Kingdom* published in 1910.

Mr. Roosevelt considers the principle of countershading a discovery of real merit as a colorist law but with limited application to birds and mammals as far as concealment is concerned. From his extended experience in the field, he holds that this concealment is due mainly to "cover and habits." With pithy arguments and forceful examples, with now and then an admission that the knowledge is incomplete and a frank, "I do not know," he covers Thayer's points, separating misinterpretations from common-sense facts and deductions. The last sentence of his conclusion summarizes his view:

"As regards the great majority of the species [of birds and mammals], the coloration, whether concealing or not, is of slight importance from the standpoint of jeopardizing or preserving the bird's or mammal's life, compared to its cunning, wariness, ferocity, speed, ability to take advantage of cover and other traits and habits, and compared to the character of its surroundings."

<sup>1</sup> THE INDIVIDUAL: A STUDY OF LIFE AND DEATH. N. S. Shaler. New York: Appletons, 1900.

## EXHIBITION OF REPTILES AND AMPHIBIANS

*By Bashford Dean*

THE Museum collection includes at the present time about two thousand amphibians and five thousand reptiles—not a strong representation as material in great museums goes, but more than a good beginning in the development of a department. Of these specimens hardly more than one per cent are on general view: the bulk of the collection in this as in other fields in the Museum will ever from the limits of space be kept in reserve for purpose of study. None the less there are, all will admit, great possibilities for the development of the popular side of the work of the department: reptiles and amphibians are apt to interest the general visitor, and they are of yeoman's service to the classes of nature study which regularly visit the galleries. Snakes, turtles, salamanders, frogs, crocodiles, lizards, all have their especial niche in non-technical natural history. And it is clear that they should be exhibited in such a way as to attract the visitor's attention to the nature of the various groups—to illustrate the principal kinds, native and foreign, to demonstrate at least the elements of their structures, development, habits, distribution, descent. As a means of teaching attractively the life habits of these creatures, a series of special case-exhibits will be prepared, each illustrating one of the larger groups. These will be brought together after the fashion of the panoramic "habitat" bird group, in a separate gallery, for the present in the southeast tower room on the second story. The Bullfrog Group is the first of this series to be exhibited. It has been prepared under the supervision of Miss Dickerson, and is described in the following paper. Her account however does not tell the reader the discouraging technical difficulties surmounted in the long work of preparation in a little developed field. The present work is an earnest of what can be done to make the remaining groups at once attractive and instructive.



A PORTION OF THE BULLFROG GROUP

Two frogs are engrossed in a chickadee on the birch branch above. The smaller frog seems likely to fall a prey to a black snake ready to strike from the white azalea near

The water of the group is a tightly-stretched transparent sheet of celluloid. The ingredients were mixed at the Museum according to a formula which gives a less brittle product than the commercial celluloid and the sheet was made by flowing this liquid on glass in layers one over the other

## SOME METHODS AND RESULTS IN HERPETOLOGY

By Mary Cynthia Dickerson

THE Bullfrog Group, which has been put on exhibition at the Museum in the east tower of the second floor, represents a July scene typical of Southern New England. Knowledge of the bullfrog consists usually in an acquaintance with his sedate appearance on the bank of a pool or with the sonorous sound of his "jug-o-rum" during summer nights. We do not realize that a pond which may chance to be the home of this giant of the frogs of North America is a small world of continual drama with the bullfrog well in the plot.

The group in connection with its descriptive labels attempts to show the general biology of the frog, its swimming, croaking, breathing under water and in air, the manner in which it "lies low" before a near enemy when it cannot escape by leaping, its food habits in connection with small mammals, birds, snakes, fish and turtles, insects and snails. It also shows the metamorphosis from the tadpole.

The Bullfrog Group is novel in that it has a transparent background, curved in panoramic fashion and made of fine and durable linen. This is painted in transparent colors, the high lights on the front, the shadows on the back, in an effort to obtain a realistic woodland scene with shifting light in it and through it as in nature. The light at the back of the canvas has been kept at the minimum and balanced on the canvas in front by a weak indirect light, while a relatively strong direct light has been focused on the foreground as if from the western sky (direction of the observer). It has been hoped to obtain by this lighting some slight illusion and perspective notwithstanding the smallness of the space ( $8\frac{1}{2}$  ft. by 6 ft.). To help the perspective in a minor degree in addition, there has been resort to vari-



Modeling the Japanese giant salamander (*Megalobatrachus japonicus*) from a living specimen loaned by the New York Zoological Park. Wholly aquatic amphibians are not likely to maintain the shape for casting when removed from the water, and must be given over to the animal sculptor for modeling



A DETAIL OF THE FROG GROUP

Sediment, water weed, pond scum, every item under water was a separate problem. The plants above are in their ecological order from the duckweed and lilies on the surface through the pickerel weeds to the higher alders and willows

The bullfrog may prove a menace in ponds where any species of food fish is expected to thrive. He usually captures a fish by a single plunge in shallow water using his hands frantically to turn the fish into the right position to swallow

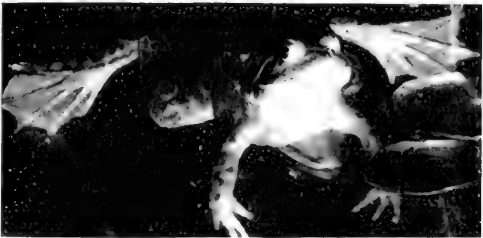


ous small devices: for instance, the foreground slopes upward to meet the background, a total of five inches; tall shrubs at the front are made to lead into ones less tall farther back, large-leaved plants such as alder and birch are in the immediate foreground, willow and other small-leaved plants at the rear. leaves of water lilies and pickerel weed are graded back from larger to smaller; while conspicuous colors, the red of Turk's cap lilies and the white of azaleas, are placed well forward and the purple pickerel weed carries the eye back where the effect of distance and shadow is desired.

The story of the group tells itself at sight: one frog is molting its skin, "swallowing it off" in typical frog fashion; a second is dashing from the water to catch a white-footed mouse descending from a deserted song sparrow's nest; another is croaking, with vocal sacs and throat expanded; a fourth is demonstrating how large a mouthful of young water snakes a bullfrog can master. Still another is making it plain that a frog's tongue is fastened in front and thrown out of the mouth to catch insects. One frog has within his rolled tongue a bumblebee from the white azalea flowers. A smaller bullfrog is



A mouthful of young water-snakes



Comfortably floating in the July pond



Catching insects about the azalea flowers



Shedding the skin, "swallowing it off" in frog fashion



AT THE EDGE OF THE JUNGLE

An unexpected meeting between cobra and water monitor; Russell's viper at the right. Cobra and viper are the two snakes used by the snake charmers in India. The water monitor (*Varanus salvator*) is the largest lizard of the world (8 to 9 feet long) and peculiar in having a forked tongue extending from a sheath like a snake's tongue.

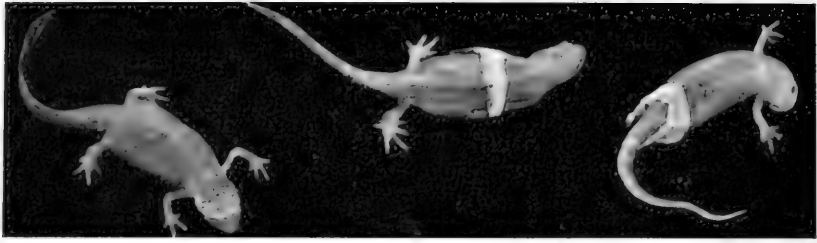
Monitor and Cobra mounted by Dwight Franklin. Viper cast in wax and colored by Thomas Bleakney. Plants of India presented for reproduction in wax by the New York Botanical Gardens. Work planned and supervised by M. C. Dickerson



Modeling the manikin for the water monitor: a living monitor at hand for study of action. Dwight Franklin of the Museum's taxidermy staff made the wax casts for the Bullfrog Group



Coloring from the live frog — which sits placidly at the left — an enlarged model of the frog's mouth for study of structures connected with eating, breathing and croaking. Thomas Bleakney has done some expert color work on many herpetology models and casts. [Model not yet completed for exhibition]



A study from life. Series of wax casts to show the American newt's method of shedding the skin: from the head backward until it binds the fore legs which are drawn out one at a time, on backward until the hind legs must be worked free

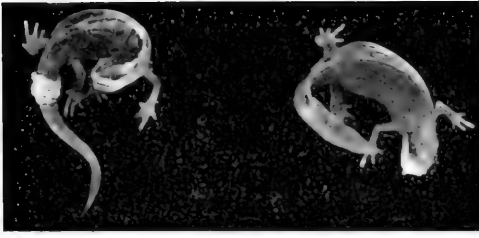
engrossed in a chickadee just alighted on a birch branch above his head, and inattentive to danger, is about to fall a prey to a black snake. A frog far over at the left is "lying low" with head lowered and hands lifted, having unexpectedly found himself in too close proximity to the black snake to make it advisable to leap for safety. Under water one frog in resting position — quite different from the resting position on land — has throat contracted and nostrils closed and like a fish is breathing oxygen from the water, his skin doing the work in place of gills. A swimming frog is sending up a stream of bubbles from the nostrils, showing that the lungs are emptied of air as the skin comes into play for breathing.

At first glance the group presents a small cove reaching into a larger expanse of water, with only four or five frogs in view. The abundance of vegetation and the great array of animal life (there are some half-hundred specimens in the group) have been subordinated to the effect of the whole. All of the animals are directly before the eye yet are so chosen and placed as to be inconspicuous except upon a more careful search, thus imitating the condition in nature.



Portion of a wax cast before color is applied. The gills are of glass. Congo eel (*Amphiuma means*) North Carolina; cast from a model from life by Frederick Blaschke

In addition to the Bullfrog Group there have been put on view recently a Monitor Group and various smaller exhibits. The exhibition of amphibia and reptiles is beset with unusual difficulty and the various species have been represented in museums heretofore by alcoholic material more often than in any other way.



Then the newt reaches back to pull the skin off the tail and swallow it according to the custom of his ancestors

power of accurate seeing. The two especially connected with the completed work are Dwight Franklin and Thomas Bleakney, although results could not have been obtained without the many complex piece molds made by James Bell and without the expert modeling of Frederick Blaschke.

Several methods are in use. If the animal has a thick and horny skin as has the water monitor or a large iguana, the skin itself is mounted over a manikin modeled from life, following the methods of the animal sculptor's work on mammals, or is filled with a soft preparation which hardens later, after it has been modeled into correct form through the skin. The modeling is from life; all work on both form and color is done from the living animal, the New York Zoölogical Park and the New York Aquarium having courteously loaned many duplicate living specimens for study.

If the skin is thin and soft, which is true in most small lizards, many snakes and turtles and all amphibia, the animal is reproduced in wax, the wax used being pure bleached beeswax (which has a high melting point so that summer temperatures are not an enemy to the exhibits) with a small proportion of Canada balsam to make it less brittle and more easily worked. The dead animal may be posed from the living and a waste plaster mold or a piece mold made, from which a cast is taken in wax. This is the method by which the frogs of the Bullfrog Group were made. There are

After much experimental work it has been found possible to make wax reproductions with fidelity to the living animal in form and color and also with lifelike pose and expression. The work has been done by certain artists who have added to the technique of clay, plaster, wax and color, the



European frog (*Rana esculenta*) showing external vocal sacs. When the frog is croaking, these sacs are inflated and collapsed with each emission of sound. Wax cast; eyes and vocal sacs of blown glass. Glass is used also for the vocal sacs of the spring peepers and American toads of the exhibit



SWIMMING SOFT-SHELLED TURTLE (*Trionyx spinifer*)

Most perfect reproductions with all the beauty and softness of color and texture of the living animal can be made in wax to replace the old display of alcoholic material. Posed and cast by Dwight Franklin; colored by Thomas Bleakney. Specimen presented by the New York Aquarium

a few wholly aquatic forms like the hellbender (*Cryptobranchus*) and the Congo eel (*Amphiuma*), which do not maintain the shape for posing when removed from water. These the sculptor must model from the living animal, which model then serves for mold and cast. In the work on snakes



A STUDY FROM LIFE

Wax casts of fighting spotted turtles (*Chelopus guttatus*) made for insertion in a group planned to show local amphibia and reptiles of the month of April

Picce molds by James Bell; casts by Dwight Franklin; color work by Thomas Bleakney



Portion of wax cast of water moccasin (*Ancistrodon piscivorus*). Moccasin closely related to the copperhead and one of the most poisonous snakes of the South. The cast is designed for a small Cypress Swamp Group not yet completed. The moccasin unlike a rattlesnake opens the mouth when threatening to strike

the skin is often removed, filled with clay, and modeled into correct form, when it is posed ready for plaster mold and wax cast. In the case of turtles many must be cast entire, the carapace being too soft to make a permanent mount. In other cases the "shell" is used and wax casts of the soft-skinned head and legs are fastened in position, while still others more thick-skinned are mounted as are the thick-skinned lizards.

The advantage of making the casts in wax lies not only in a great susceptibility of this medium to take and retain fine detail, not only in a transparency which adds greatly to the lifelike effect in many amphibia, but also in a surface of such character that it takes oil color with an effect of life texture.

Soft skin texture cannot be gained with a hard plaster surface. When a form is too large to cast in wax, like the giant salamander of Japan, and must be cast in plaster, the plaster surface is afterward sprayed with a coating of wax.

An exhibit of any group of animals to interest other than technical students must be shown from the life standpoint and in relation to man, especially a group repellant because of mystery and myth man has inherited from a time of less knowledge. Amphibia and reptiles should hold a considerable place in the exhibition of a museum for many reasons. They are of great antiquity. The amphibian race bridged the gap in descent between water life and land life, and reptiles, developed from these early amphibians, gave rise through some primitive group to mammals. Thus both are in the direct line of vertebrate evolution.

In the light of this dominant position of the past and the ancestral relation to man, the amphibia and reptiles of to-day take on peculiar interest. Descended from forms of considerable or great size, modern amphibia and reptiles present a race of pygmies, reminiscent of the giants



Mounting the skin of a lizard of Tropical America (*Iguana tuberculata*). The skin, filled with a soft preparation, is tooled into shape from a living model and the preparation within hardens in the permanent form. Mr. Blaschke brings the same skill to reptile taxidermy that he displays in his work on mammals

of millions of years ago in a few forms only, such as the nearly extinct elephant tortoise of a few tropical islands, the leatherback turtle of tropical seas, the gavial of India, the largest modern reptile, and the giant salamander of Japanese streams. Also neither race gives promise of advance for the future. Modern amphibia number only one-eighth of the race of fishes and one-tenth of birds and have taken no step toward freeing themselves from dependence on fresh water, in fact on moisture in a constant supply, and modern reptiles seem not much better placed for the future being fitted for life in equatorial regions only and absolutely dependent on heat for activity. The very high specialization however, which removes from them the chance of advance, gives them unusual value for exhibition in an educational institution like the American Museum. For perhaps in no other vertebrate groups is there more opportunity for the study of remarkable relations to environment including many instances of economic worth and direct relation to agriculture through the destruction of insect and rodent enemies; as also opportunity for the study of examples of structure, embryology and relationship, illuminating as proofs of the important rôles played in the development of intelligent life on the earth.

It would seem fortunate for museum exhibition that some successful methods have been found, and still others are likely to reward research, for reproducing these forms adequately and permanently.



## MUSEUM NEWS NOTES

SINCE the last issue of the *JOURNAL* the following persons have been elected to membership in the Museum:

*Patrons*, PROFESSOR and MRS. ALBERT S. BICKMORE and MR. CHARLES H. SENFF;\*

*Life Members*, MESSRS. CHARLES L. BERNHEIMER, GEORGE BLEISTEIN, CHESTER L. COLTON, W. BAYARD CUTTING, CHARLES J. EDER and JOHN V. IRWIN;

*Sustaining Members*, DR. SAMUEL MURLAND and MRS. ELISABETH C. T. MILLER;

*Annual Members*, MESSRS. GEORGE L. ADAMS, HENRY SHERMAN ADAMS, JAIME DE ANGULO, JAMES H. S. BATES, GEORGE POWELL BENJAMIN, WILLIAM H. BLISS, SAMUEL J. BLOOMINGDALE, LOUIS BOURY, JULIEN T. DAVIES, JR., MOSES H. GROSSMAN, JOHN KNAPP HOLLINS, FRANK HUGHES, J. HEMSLEY JOHNSON, BENJAMIN G. PASKUS, M. BERNARD PHILIPP, N. TERHUNE, J. C. THAW, C. J. ULMANN, R. WEIL, and CASPAR WHITNEY, MMES. SAMUEL Q. BROWN, WILLIAM KEITH MITTENDORF, and ANNA SHEPARD PIERCE.

ON July 17 the Board of Estimate and Apportionment appropriated \$200,000 for the construction of the foundations of the southeast wing and court building and \$75,000 for furnishing and equipping unfinished portions of the building.

PRESIDENT HENRY FAIRFIELD OSBORN and MR. MADISON GRANT spent the early part of September with Mr. Brown in Alberta. The following is an extract from President Osborn's latest letter:

... Brown and Mr. Grant met me at Red Deer on Monday last, August 28, and we started almost immediately down the river in a small craft loaded to the gunwales. The current, three to five miles an hour, gave us, with Brown sculling and steering at the rear, a three and one-third average speed and we passed all the rapids safely, camping four nights on the shore, prospecting and visiting all important sites and quarries. . . . Brown has discovered the only method of working these rich and virgin formations and it looks as though there would be one or perhaps two seasons more. . . . The region about here is very rich. Kaisen has taken up another *Trachodon* and parts of two others await removal. Yesterday we secured a fragmentary *Albertosaurus* skull. All are well and in fine spirits. We start for the remaining 125 miles to-morrow morning. . . .

DR. FREDERIC A. LUCAS was appointed Director of the Museum by the Board of Trustees on May 8 and assumed his new office on June 15.

\* Deceased.

AMONG the scientific visitors at the Museum this summer were Dr. Friedrich von Huene of Tübingen, and Dr. Franz Schaffer of Vienna. Dr. von Huene remained nearly two months studying the collections of extinct reptiles. Both gentlemen later visited the field parties in Nebraska and Wyoming and various noted fossil localities in the West, and expressed the greatest enthusiasm over the palaeontological treasures brought together in this and other American museums, and the wonderful extent and richness of the western fossil fields.

DR. WILLIAM K. GREGORY was appointed Assistant Curator in the Department of Vertebrate Palaeontology at a meeting of the Executive Committee in June. Dr. Gregory's *The Orders of Mammals*, published by the Museum in 1910, is a standard book of reference invaluable to teachers and students in the universities of this and other countries. It was on receipt of this volume that Dr. R. Broom, the leading authority on mammal-like fossil reptiles of South Africa, recalling recent work of New York men of science, wrote: "I am afraid New York is taking the place once held by London in the days of Owen, Huxley and Parker and I think it fully deserves to lead."

THE DEPARTMENT OF VERTEBRATE PALEONTOLOGY had three expeditions in the field this summer. The Alberta expedition, in charge of Associate Curator Brown, continued the search for Cretaceous dinosaurs in the rich fossil fields of the Red Deer River. The Wyoming expedition, in charge of Associate Curator Granger, will probably complete this year the exploration of the Big Horn Valley for remains of the earliest ancestors of the horse, and other animals of the Lower Eocene. The third expedition, in charge of Mr. Albert Thomson, has resumed work in the great fossil quarry of Lower Miocene age at Agate, Nebraska.

PROFESSOR BASHFORD DEAN early in July officially represented the American Museum at the Museums Association's meeting at Brighton, England, and in September at the Centennial Celebration of the University of Christiania.

DURING the summer DR. CLARK WISSLER spent some time among the Dakota Indians on the Pine Ridge Reservation, giving especial attention to military and other societies. Other members of the staff of the Department of Anthropology visited various Indian tribes of the United States and Canada continuing their systematic field study of other summers. This work will receive full report later.

THE administrative offices of the Museum have been removed from the east wing and will now be found on the fifth floor near the elevators.

MR. CHARLES L. BERNHEIMER has been made a Life Member in recognition of his contribution for cetacean work in Japan.

MR. CHARLES J. EDER of Palmira has been elected a Life Member because of the courtesies he extended to the Museum's expedition to the United States of Colombia.

MR. V. STEFÁNSSON reports from the Dease River, Arctic America, wonderful success in ethnological work. He has discovered a "new" Eskimo tribe, one that has never seen a white man; he also finds a Scandinavian-like people in Victoria Land. Through the courtesy of the English travelers, Messrs. Melvill and Hornby, who have a boat on Great Bear Lake, the collections will be carried out to Fort Norman and the Mackenzie River. Mr. Stefánsson's letters will be quoted in a later JOURNAL.

THE Museum has in press a *Guide Leaflet* on the methods of making the wax flowers, leaves and fruits on display in the Forestry Hall and used as accessories in habitat groups.

A SERIES of eight lectures on evolution by Professor Henry E. Crampton, formerly delivered as the Hewitt lectures of Columbia University, has been brought out in book form by the Columbia University Press.

PROFESSOR HENRY E. CRAMPTON returned September 19 from a biological expedition to South America and the West Indies. He succeeded in reaching Mount Roraima, at the junction of the Venezuela, Brazilian and Guiana borders. Mr. Roy W. Miner and Dr. Frank E. Lutz were also members of the expedition, the former returning from Dominica in July and the latter from Kaieteur Falls in British Guiana, in August.

DR. LOUIS HUSSAKOF spent several weeks collecting fossil fishes in the Devonian formations of Kentucky and Ohio. Some valuable material was obtained including a number of specimens of the giant *Arthrodira*, *Titanichthys*. The expedition was made possible through the Cleveland H. Dodge Fund.

THE following appointments have been made: Mr. J. B. Foulke, Superintendent of Building; Mr. Harry F. Beers, Assistant Superintendent of Building; Mr. George N. Pindar, Registrar.

MR. HARLAN I. SMITH, Associate Curator in the Department of Anthropology, has resigned his position to accept a curatorship in the new museum at Ottawa.

MR. ROY C. ANDREWS will leave during the last week of November on an expedition to the Orient. He will visit the whaling stations of southern Korea, then outfit at Seoul and travel into the mountains of north Korea, a region unknown zoologically.

THE installation in the new Hall of Minerals is almost completed, and more than three thousand specimens are brought to view. Among recent additions are the remarkable tarbuttite (basic zinc phosphate) associated with vanadinite from Rhodesia, Africa, a beautiful white beryl, enclosing tourmaline, from Pala, California, and important specimens of benitoite and neptunite from the same locality.

THE MUSEUM recently acquired through purchase from Mr. Juan E. Reyna of Ithaca, New York, some interesting fragments of ancient Mexican codices. The fragments were taken from the walls of a church at Tlaquiltenango, Morelos, and are about one hundred in number. They represent parts of several manuscripts on maguey paper and probably date from soon after the arrival of the Spaniards. The church in question was completed in the year 1540. The manuscripts had apparently been collected by the priests and pasted face down on the walls of the cloisters instead of being destroyed outright as was the usual custom. The collection is of peculiar value because the point of origin is so clearly indicated. Tlaquiltenango is situated in the ancient territory of the Tlahuican nation, a branch of the great Nahuan stock.

DR. J. R. WALKER, United States Indian Physician, of Pine Ridge Reservation, South Dakota, has been a voluntary contributor to the Department of Anthropology for several years. He is especially interested in the mythology and ceremonies of the Dakota Indians, among whom he has lived for thirteen years. During the past year he gathered some four hundred pages of manuscript written by Indians who have learned to write their own language in the Rigg's alphabet. These manuscripts contain unusual material upon the most complex and sacred of Indian conceptions.

DURING the summer Professor C-E. A. Winslow devoted considerable time to the study of an epidemic of a peculiar acute tonsillitis which affected some 1500 persons and caused 50 deaths in the vicinity of Boston and which proved to be due to an infected milk supply. This outbreak of tonsillitis is the first of the kind in this country and the most serious ever recorded anywhere.

## LECTURE ANNOUNCEMENTS

### MEMBERS' COURSE

The first course of lectures for the season 1911-1912 to Members of the Museum and persons holding complimentary tickets given them by Members will open in November.

### PUPILS' COURSE

The lectures to public school children will be resumed in October.

### PEOPLE'S COURSE

*Given in coöperation with the City Department of Education*

Tuesday evenings at 8:15 o'clock. Doors open at 7:30.

The first five of a course of eleven lectures on "Great Classical and Romantic Composers" by MR. DANIEL GREGORY MASON. Illustrated at the piano.

October 3 — "Johann Sebastian Bach."

October 10 — "Joseph Haydn."

October 17 — "Wolfgang Amadeus Mozart."

October 24 — "Ludwig von Beethoven: His First Period."

October 31 — "Beethoven: His Second Period."

Saturday evenings at 8:15 o'clock. Doors open at 7:30.

The first four of a course of eleven lectures, "From the Rhone Glacier to the Pillars of Hercules; Courtly Provence and Romantic Spain," by PROFESSOR CHARLES U. CLARK of Yale University. Illustrated by stereopticon views.

October 7 — "The Valais and Savoy."

October 14 — "The Dauphiny."

October 21 — "Lyons, Queen of the Rhone Valley."

October 28 — "In Troubadour Land."

THE AMERICAN MUSEUM  
OF  
NATURAL HISTORY

FOR THE PEOPLE  
FOR EDUCATION  
FOR SCIENCE

PUBLIC EDUCATION NUMBER

THE  
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# American Museum of Natural History

Seventy-seventh Street and Central Park West, New York City

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THE MUSEUM IS OPEN FREE TO THE PUBLIC ON EVERY DAY IN THE YEAR.

THE AMERICAN MUSEUM OF NATURAL HISTORY was established in 1869 to promote the Natural Sciences and to diffuse a general knowledge of them among the people, and it is in cordial coöperation with all similar institutions throughout the world. The Museum authorities are dependent upon private subscriptions and the dues from members for procuring needed additions to the collections and for carrying on explorations in America and other parts of the world. The membership fees are,

Annual Members.....	\$ 10	Fellows.....	\$ 500
Sustaining Members (Annual).....	25	Patrons.....	1000
Life Members.....	100	Benefactors (Gift or bequest)	50,000

THE MUSEUM LIBRARY contains more than 60,000 volumes with a good working collection of publications issued by scientific institutions and societies in this country and abroad. The library is open to the public for reference daily — Sundays and holidays excepted — from 9 A. M. to 5 P. M.

THE MUSEUM PUBLICATIONS are issued in six series: The American Museum Journal, Annual Report, Anthropological Papers, Bulletins, Guide Leaflets and Memoirs. Information concerning their sale may be obtained at the Museum Library.

GUIDES FOR STUDY OF EXHIBITS are provided on request by the Department of Public Education. Teachers wishing to bring classes should write or telephone the Department for an appointment, specifying the collection to be studied. Lectures to classes may also be arranged for. In all cases the best results are obtained with small groups of children.

WORKROOMS AND STORAGE COLLECTIONS may be visited by persons presenting membership tickets. The storage collections are open to all persons desiring to examine specimens for special study. Applications should be made at the information desk.

THE MITLA RESTAURANT in the east basement is reached by the elevator and is open from 12 to 5 on all days except Sundays. Afternoon Tea is served from 2 to 5. The Mitla Room is of unusual interest as an exhibition hall being an exact reproduction of temple ruins at Mitla, Mexico.



# The American Museum Journal

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MARY CYNTHIA DICKERSON, *Editor*

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THEY BEHOLD A "CITY" OF STRANGE BIRDS

Some of the brightest spots in childhood are connected with a vague realization of the beauty and mystery of the world

The Museum wishes to welcome and honor the children who come within its walls. It publishes in this number of the JOURNAL the pictures of a few of the children who have been among its recent visitors

# The American Museum Journal

VOL. XI

NOVEMBER, 1911

No. 7

## COÖPERATION IN EDUCATION

*By William H. Maxwell*

Superintendent of Public Schools, New York City

THE present contract for coöperation has existed between the public schools and the American Museum of Natural History for more than thirty years. Meantime the development of the schools has paralleled the growth of the Museum and both have kept pace with the phenomenal upbuilding of the city. For the Museum's part in this I extend my congratulations, because while the public school system has but developed in accordance with the progressiveness of the times, the Museum has broken away from all records of museum organization and maintaining its stand as an institution of science has distinctly identified itself with education also. By so doing it has made possible for the children of the City of New York many good things from which they would otherwise have been shut off.

The teachers of several thousands of classes in the schools are working under a difficulty of conditions not equalled in any other quarter of the globe. One-third of the hundred thousand new pupils of each year cannot speak English and moreover come from centers of the City where people live one thousand to the acre and have the attendant ills of such a congestion of population. The problem is to galvanize these classes into a spontaneity of interest that will carry them into a new language, into the knowledge of the grade and at the same time into a more wholesome, more sanitary life. For these teachers the Museum's lectures and collections serve royally in the threefold purpose.

I hail with satisfaction the trend of the Museum's work in its new department of public health, and in its woods and forestry and habitat groups which form a continually stronger lure to out-of-door life. Even if nature study may not yet have been developed to give children practical knowledge for life activities, it most positively does give a large working interest in the direction of such knowledge.

It will be increasingly the pleasure of the teachers to use the power the Museum puts into their hands. In the near future these boys and girls will be in control of the destiny of our City and the Museum's present coöperation in their education will bear fruit a few years hence in citizens more fitted to deal wisely with large questions on which depend health and moral well-being. For the study of nature is the foundation of that knowledge which leads to increased productivity in industry and of those ideals of life that make for improved conditions of living.

## THE MUSEUM AND THE PUBLIC LECTURE

*By Henry M. Leipziger*

Supervisor of the Public Lecture System of the Board of Education, New York City

ON the occasion of the laying of the corner stone of the Museum about thirty-five years ago, Professor Henry of the Smithsonian Institution used these words: "How incomparably greater would the importance of this Museum be were there connected with it a professor who would give courses of free lectures on the objects which it contains, who would expound the laws of the phenomena of nature, who would discourse on the changes the world has undergone during geological periods."

The Public Lecture System of the Board of Education coöperating with the American Museum of Natural History carries out the suggestion made by the distinguished scientist and continues a work inaugurated by Professor Bickmore soon after the erection of the first section of the Museum building. Many lecturers carry the treasures of the institution to every corner of this great city and the desire to visit the Museum is everywhere awakened. More than that those who come are prepared by these lectures to appreciate the importance and the meaning of its priceless collections.

The Museum and the public lecture add to the joy of life as well as to the knowledge of life. They teach that knowledge is not alone a means of livelihood but a means of life. Both are doing their share to increase the number of those who take delight in nature and its wonders; who find genuine recreation in it; who find a solace when sorrow comes; who become strengthened to resist temptation.

Many of the greatest men of science have come from the humblest surroundings. The immortal Faraday, while attending a course of lectures by Sir Humphry Davy at the Royal Institution, caught the inspiration which determined his future career. So may other men arise to benefit the world, who shall have been directed to their career through the combined influences of the museum and the public lecture.

### A WORD OF CONGRATULATION FROM PRESIDENT JOHN H. FINLEY OF THE COLLEGE OF THE CITY OF NEW YORK

THE development of the Museum of Natural History as a vital force in the community is most gratifying. It is persuading the past to help the present and compelling both through its guidance of public opinion to make living under urban conditions better in the future. I am particularly grateful for what the Museum is doing toward bringing within the reach of the schools and higher equivalent institutions the advantages of the institution as far as possible. The Museum is no longer accurately defined as a "repository"; it is a great living teacher.



ABSORBED IN STUDY OF THE METEORITES

"Many of the greatest men of science have come from the humblest surroundings . . . So may other men arise to benefit the world, who shall have been directed to their career through the combined influences of the museum and the public lecture"



*With the pelicans.* The Museum is a wonder world of true stories for the younger children who are brought to the Museum by the boys and girls of school years.



*Studying the home life within an Indian tipi.* As one walks about the Museum, he can but remark the large numbers of children eagerly recording what they see or copying facts from labels. The sight is a spur to the Museum to give its exhibits a still more civic trend, a still more human touch and to make its labels tell more fully and simply just what the child wishes to know and should know.

## THE MUSEUM OF THE FUTURE

*By Henry Fairfield Osborn*

FOR the American Museum this is 'Teachers' Year, and our energies are for the time turned chiefly in the direction of making the institution a more vital part of the great free civic educational system in which New York is destined to lead the world. To set this forth we have prepared an educational map, which shows what our City offers as a whole in its combined schools and libraries, in science, literature and art; no other city in the world offers so much or offers it so generously. I wish we could afford to put this map into the hands of every teacher and every pupil, for study of what might be called the "geography of things worth seeing and worth doing." To show more clearly what may be seen in this Museum we are also issuing to-day a new *Guide Book* to all the exhibits.

In Pittsburgh recently I was delighted to meet a party of San Francisco public school boys who had worked their way east through all the great cities, and to learn that while in New York they had spent the greater part of their time in the Natural History Museum, in the Zoölogical Park and at the Aquarium. This little incident in itself proves that we have already advanced far along educational lines; but we are still not satisfied, and Director Lucas and the Scientific Staff are concentrating their time and attention for three or four months on the practical and very difficult problem of elucidation of all the exhibition halls. You have little idea in walking through these halls what labor they have involved, what sacrifices men have made and are making for them to-day in all parts of the world, how much the workers in this Museum are attached to what may be called the spirit of the institution — namely, the desire to extend the call and vision of Nature.

We realize that teachers cannot all be specialists, that we must make many of our special collections more readily understood by you, if you in turn are to bring your pupils here and explain objects and principles to them. In so far as we draw on public funds, public education is our chief and final purpose; toward this all our plans tend; for this the City erects the great building and gives the larger part of the maintenance; for this the Trustees and other friends give their time and means; for this members of the Scientific Staff are exploring in all parts of the world, collecting and arranging objects of natural history constantly inventing new methods to attract and to impress visitors, young and old.

Very few people, even among those who have the means to travel, really see Nature in the sense of understanding it, and to the millions within the cities Nature is practically unknown. So we are interpreters; we are trying to tell in a very simple way the laws which the greatest minds have wrestled with from the earliest times, and we are also trying to add to these

laws, for it is part of the genius of the institution to create new knowledge as well as to spread it. This gradual elucidation of the deep and difficult is to my mind one of the most marvelous features in the growth of science. Some great law is first in the will of the Creator, then, like the light of a star so distant that it takes ages to reach the earth, it reaches the mind of some great naturalist, and finally it comes down, down, down to the vision of the very youngest. And the best way to learn one of these laws is to see it in operation; this is far better than to read about it, for what is seen becomes part of oneself.

In the development of our halls there is a constant effort to shut out the human artificial element, to bring the visitor directly under the spell of Nature, as under a great and infinitely gifted teacher, by making every case, every exhibit, tell some clear and simple story which appeals at once to the imagination, to the reasoning instinct and to the heart.

There are three especial ends we are endeavoring to advance this year: first, to bring within your grasp the scope of the Museum as a whole; second, the particular meaning and lesson of each of its parts; third, how this meaning may best be impressed on the young mind. I believe strongly that the average child is a better nature observer than the average adult, and if you let children alone they will see a great deal. Thus there are one or two suggestions which I would make from more than thirty years of experience as a teacher: first, look at the object and get all you can out of it yourself, then read about it; second, try to make the child work out the reason of things before you work it out for him. In brief, nearly all the works and processes of man are complex, and one great lesson we have to learn from Nature is its simplicity. Here are to be seen simple lessons in animal and plant architecture, in beauty, in government, in coöperation, in endurance. Among the insects, the ants, bees and wasps lead wonderful lives, not alone in their industry; we may consider all their ways and be wise. The moral lessons, much needed for our day and generation, to be learned in the Habitat Groups of Birds are endless — the maternal and paternal love, the happy family life of the young, the joy of living, the beauty of their homes. Many of the so-called savages shown in this Museum can teach us far more than the so-called civilized peoples — their industry, their patience, their sense of beauty which adds the æsthetic touch to all their implements, often their integrity, their courage, their fidelity.

Nature study in the school and in the open already has hosts of friends; it is no longer on trial, it is an established system. Nature study in the museum is a newer part of the same educational movement. The great museum can, however, do what neither school, college, nor even the university can; it can bring a vision of the whole world of nature, a vision which



cannot be given in books, in classrooms or in laboratories. This is a branch of public education which is especially urgent in a great city, crowded with the works of man, and where except for the nightly vision of the heavens obscured by smoke and dust, and the altered wild life of our parks, the works of Nature are totally destroyed.

Our future ideal for the Museum is to provide at no cost a little journey on this planet and among the heavens beyond it. Our ideal of museum order is to pass, by a natural and easily seen sequence, from country to country as you would in travel, or from age to age in the past history of the earth, or from lower to higher stages of life in the history of animals and plants. This is what we are working toward although it is by no means attained. We propose to add astronomy, and geography of the land and of the sea to the older and traditional subjects of the museum. Already the child can see here what Aristotle dreamt of but never saw, and what Darwin and Huxley put into prophecy but did not live to see.

We want the teachers of New York to feel that this Museum is part of their educational plant, we want their coöperation, their suggestions, and their frequent presence.





A CLASS FROM THE PUBLIC SCHOOLS STUDYING THE MOOSE GROUP

226 The study of a truthful and attractive portrayal of animal life cannot fail to make children more broadly, more accurately and more sympathetically educated

## EVOLUTION OF THE EDUCATIONAL SPIRIT IN MUSEUMS

*By Frederic A. Lucas*

The motto of the American Museum is "For the People, For Education, For Science" and the institution has ever striven to live up to that motto. Hampered somewhat at first by the bonds of heredity and tradition it was the first museum in this country to plan exhibits for the public alone; it has been a leader in the cause of education and has ever tried to set an example for sister institutions to follow.

MUSEUMS were not educational at the outset. Not only this, the benefit of the public was something that did not enter into the thought of their founders. For museums had their origin in the collections of paintings, statuary, and other objects of art, brought together by men of wealth to gratify their love of the beautiful, or in collections of natural objects and "curios" gathered mainly too by men of wealth, to gratify their desire to know something of the life of distant lands. Then came collections brought together by scientific societies with a real desire to foster knowledge, although mainly of benefit to a few individuals, and then the museum, opened to the public on the payment of a fee and quite as much for the amusement of visitors as for their instruction.

Yet we must not forget that Peale the artist, a contemporary of Washington, conducted one of these semi-popular, semi-scientific museums and that in many ways his ideas of the educational possibilities of museums were quite in accord with those held to-day. At a time when public schools were just springing into existence and free libraries did not exist at all, the establishment of free museums could not be expected, the more that according to the views of some the public museum is the latest and highest, though by no means last, institution for public education. First we have public schools, then libraries and now the museum. The opening of the Louvre to the populace seems to have been the first really free public museum and this was rather an expression of the fierce demand for "Liberty, Equality and Fraternity" than done with a deliberate intent to benefit the people.

Love of beauty precedes the love of knowledge, so the opening of the Louvre preceded the opening of the British Museum. To us the view then taken of the conduct of a *free* museum is somewhat amusing. When we do not have at least five hundred visitors a day at the American Museum we begin to worry lest the public is losing interest or our collections ceasing to be attractive; and yet at the outset the number of visitors that might enter the British Museum in one day was limited to thirty. We not infrequently have an attendance of one thousand to twelve hundred at one of our lectures. Under the old regime it would have taken that audience an entire year to pass through the British Museum.

Little by little this state of affairs has changed. The public was first permitted, then invited, then heartily welcomed to enter the museum.

Also as the attitude of museums has changed, so has the character of their collections, or to be exact, the character of the part the public sees and in which it is interested — the exhibits.

The museums of fifty years ago or even much less were rather dreary affairs compared with those of the present day. The visitor was greeted by row upon row of animals, most literally stuffed, arrayed in ranks and accompanied by labels whose principal mission was to convey to the public what to them is a most unimportant matter, the scientific names.

The aim of the modern museum is to illustrate ideas, not merely to display objects, to take the facts or information gathered by long years of patient study and so present them that they may be understood by everyone. More than that it aims to present these facts in such manner as to interest the visitor, having come to understand that if you cannot interest him you cannot instruct him. For the average museum visitor does not come in search of knowledge but to be interested, and "rational amusement" was long ago counted as one of the purposes of a public museum. So instead of a host of beasts, birds, and fishes marshalled in serried cohorts we have our groups showing not only what the creatures are, but where they live and what they do. In our ethnological halls you see not only the objects used by strange and far-off peoples, but the people themselves engaged in the occupations of everyday life.

We have our Children's Room though this is merely in its beginning, our lectures, our guides to the collections, all with the purpose of making the collections of real use to visitors.

These things have not come to pass all at once; they have come about as a part of the evolution of museums, for there is an evolution of ideas and institutions, as well as of living things. I can recall every step in the progress of the American Museum; I have seen it change from a mere storehouse of objects to a great educational institution.

Dr. Goode of the National Museum used to say that the aims of a museum were three — record, research, and publication: record by the preservation of objects, research by their study, and publication by giving to the world the information thus gained. Had Dr. Goode been spared but a few years longer, he would have added to the above mentioned purposes of a museum the further aim, education of the public. And let me say here that no one in this country did more than he to further the educational influence of museums and that his loss was a great calamity.

An educational museum may be defined as a museum in which the objects shown, the manner in which they are arranged, and their accompanying labels illustrate some fact in nature or in the history of mankind in such manner that it may readily be grasped by all, and this is what the American Museum is endeavoring to be for the public.

## PROFESSOR ALBERT S. BICKMORE: EDUCATOR

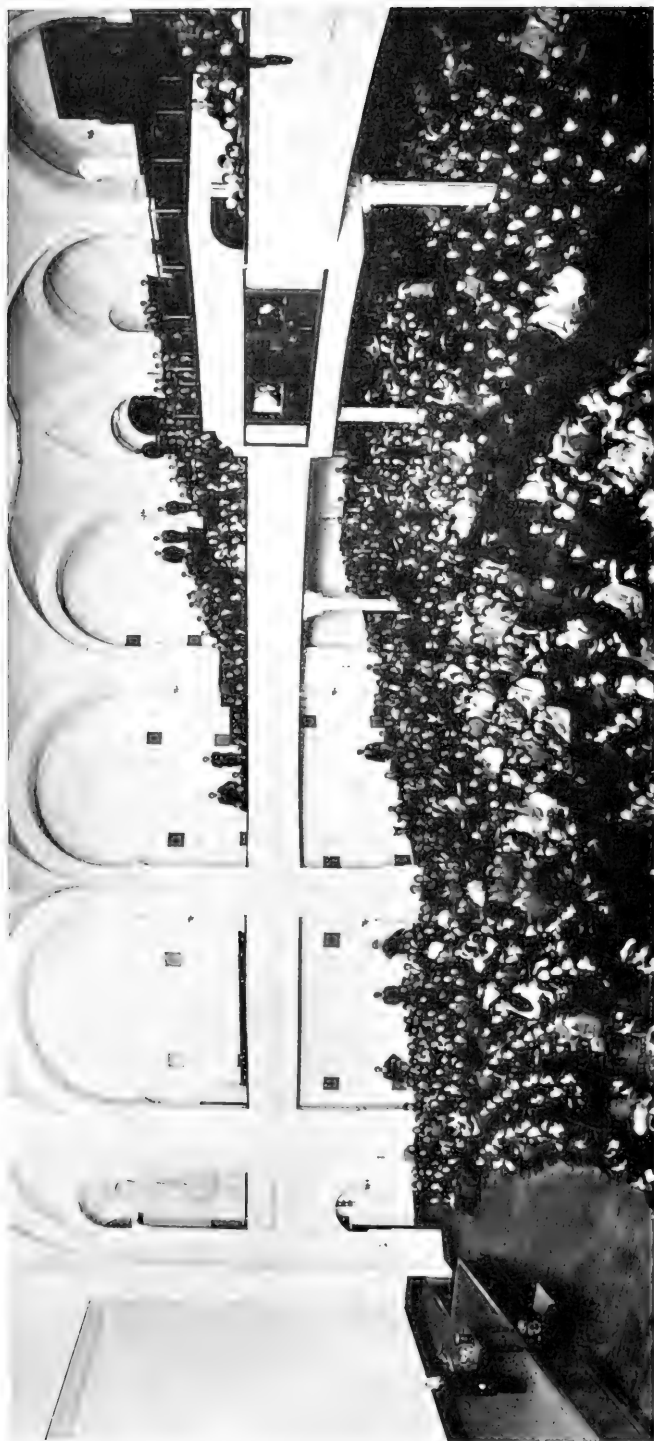
ONE OF THE ORIGINATORS OF THE AMERICAN MUSEUM OF NATURAL HISTORY,  
ALSO THE ORGANIZER AND FIRST CURATOR OF THE DEPARTMENT OF  
PUBLIC EDUCATION

*By Edmund Otis Hovey*

FORTY-NINE years ago (1862) there came to New York from the inspiring atmosphere of the laboratory of Louis Agassiz at Harvard University a young man with an idea — to establish in the metropolis of the country a museum of natural history worthy the name and the fame of the whole United States, one that should grow with the growth of the nation. That young man was Albert S. Bickmore, born of sea-faring family on the coast of Maine, brought up amid the inducements to nature study furnished by the ocean, the beach and the virgin forest, and educated at Dartmouth College. Directly after graduation with the class of 1860, he became a student under and later an assistant of the great naturalist Louis Agassiz. The conversations between Agassiz and the noted scientists of this country and Europe that took place in the famous laboratory were listened to with keen interest by young Bickmore, and were a means of broadening the youthful student's point of view. These and other experiences led to the conception of founding and building up a great museum in New York. The idea was broached to Professor Asa Gray, but he discouraged it through the feeling that New York was too commercial in character to appreciate and support such an institution. On the other hand, Dr. Jules Marcou, a famous geologist who was then residing in Cambridge, favored the plan most heartily and showed his practical interest in the museum as finally developed by bequeathing to it his extensive and valuable library of geological works and maps. The real impetus however came from a fortunate hour spent with Sir H. W. D. Acland, then the foremost naturalist and museum man of England, who heartily endorsed the young student's scheme.

Nine months' service in the Union army in 1862-1863 interrupted these plans, although part of the soldier naturalist's time was utilized in collecting mollusks for his famous teacher, but neither New York nor the country was ready for the launching of the museum project, and after the mustering out of his regiment Bickmore returned to his studies and work at the Agassiz Museum. An opportunity to go to the Far East on an exploration cruise was eagerly embraced, and three years, 1865 to 1868, were spent most profitably in China, Japan, Siberia and the Dutch East Indies.

Meanwhile sentiment in New York was ripening for undertaking the enterprise. Mr. W. A. Haines, who had the largest private collection of



The Museum has enjoyed Professor Bickmore's services for a period of more than thirty-six years. Through his work as first Curator of the Department of Public Education the Museum's lectures became so popular that in 1900 the present Auditorium was built to accommodate the large numbers in attendance.

shells in the country, Mr. D. Jackson Steward, whose collection was smaller but very choice, and Mr. Robert L. Stuart, who had many rare books, a good collection of shells and an excellent series of mineralogical specimens, with other public-spirited men, had striven in 1865 to raise funds for the proper support of the Lyceum of Natural History of the City of New York (now known as the New York Academy of Sciences) and the erection of a building for the housing of its large and valuable collections. The effort had been unsuccessful, in spite of the fact that for nearly fifty years the Lyceum had maintained in this city a natural history museum of much merit and considerable reputation. The following year, 1866, the building of the University Medical College in Fourteenth Street, in which the Lyceum collections were stored, was burned and its contents destroyed. The field therefore was clear for the establishment of a new museum which should have no connection with any existing society and should be devoted wholly to the promotion of natural history by means of research and the display of specimens. What was imperative was the advent of a man of science possessing the inspiration and energy required for bringing together the men interested in the subject and organizing the whole project.

The opportunity fell to Albert S. Bickmore, who while on his journey in the East had corresponded actively with Mr. William E. Dodge, 2d., with constant reference to the ultimate establishment of a natural history museum, Mr. Dodge and Mr. Theodore Roosevelt, Sr. being particularly interested in such a project. When Mr. Bickmore returned the war was over; the North had entered on a period of great prosperity; men of affairs had become used to the thought of large enterprises involving the expenditure of great sums of money, and the young naturalist himself was better equipped than before for developing and pushing plans for a really great museum. He had the boundless enthusiasm of youth and the buoyancy of a wonderfully sanguine disposition. He was full of his subject and by reason of his very enthusiasm New York's men of means were forced to listen to the poor young man from Maine. In season and out of season the museum project was brought forward, until in the autumn of 1868 were held the first informal conferences at the residences of Mr. W. A. Haines, Mr. Benjamin H. Field and Mr. Robert Colgate, that led to the sending of a letter<sup>1</sup> to the Commissioners of Central Park offering to procure a certain rare and valuable collection as the nucleus of a museum of natural history if the Commissioners would provide for its reception and development. This offer was accepted over the signature of Andrew H. Green,

<sup>1</sup>This letter was signed by Messrs. James Brown, A. T. Stewart, B. H. Field, Adrian Iselin, R. L. Stuart, M. O. Roberts, Theodore Roosevelt, George Bliss, M. K. Jesup, W. T. Blodgett, J. D. Wolfe, Robert Colgate, I. N. Phelps, L. P. Morton, W. A. Haines, J. P. Morgan, A. G. P. Dodge, D. J. Steward and Howard Potter.

then Comptroller of the Park, and on the 19th of January, 1869, a meeting was held at the home of Mr. Benjamin H. Field. This meeting, when the first Board of Trustees was chosen, is considered the actual foundation of the American Museum of Natural History.

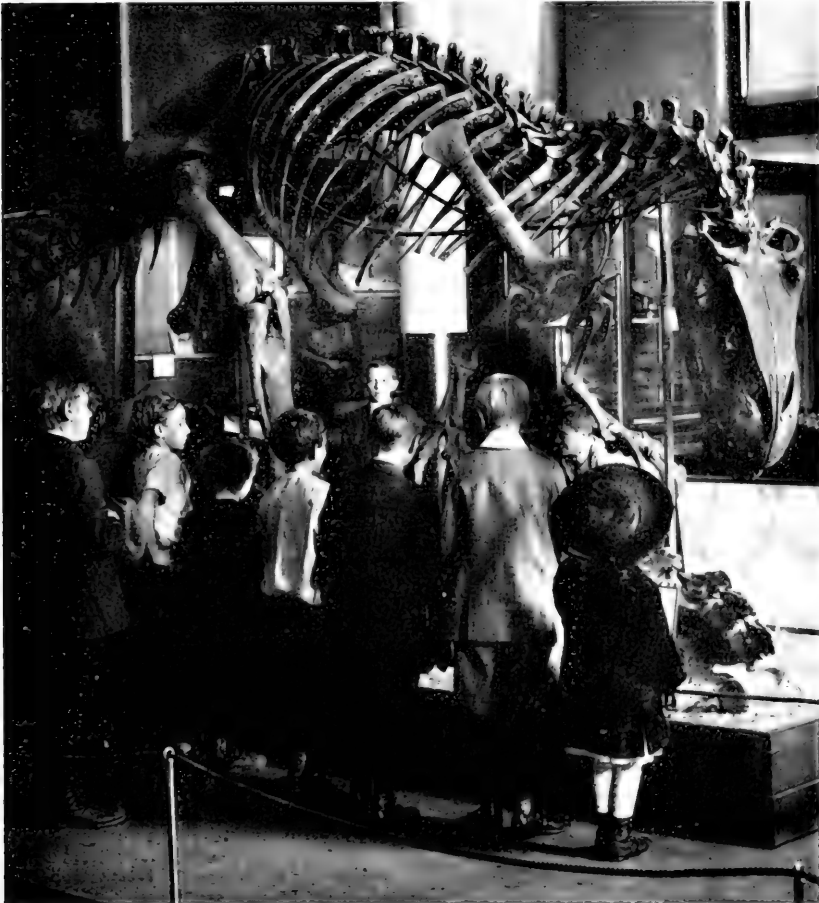
The draft of the present charter was drawn up by Hon. Joseph H. Choate and accepted without change at the next meeting. When the question arose as to the manner of raising the money for the running expenses of the institution, it was Professor Bickmore who suggested the plan which has worked so well that it has since been adopted for other institutions, whereby the municipality provides the ground and the buildings and pays a certain sum per year toward "maintenance," which includes salaries and wages, heat, light, power and repairs, while the collections are owned in the name of the trustees of the institution and are increased by the expenditure of special and general funds provided for through their efforts. Professor Bickmore also was the one who made the happy suggestion that the word "American" be included in the name of the institution, thus indicating its national scope, and it was he to whom was intrusted the delicate and important mission of presenting to the State legislature the bill incorporating the museum. Through the influence of the Hon. Samuel J. Tilden and Senator William M. Tweed the bill was passed exactly on the broad lines devised by the founders. In later years Professor Bickmore was an important agent of the Trustees in getting Manhattan Square reserved exclusively for the purposes of the Museum, in changing the course of the transverse road through Central Park so that it ended at West Eighty-first Street instead of at West Seventy-ninth Street, as originally projected, in procuring the establishment of a carriage entrance to Central Park at West Seventy-seventh Street, and in obtaining through the legislature appropriations from the city for one section after another of the Museum building till seven integral portions of the great structure were completed.

As first superintendent of the Museum — 1869 to 1884 — Professor Bickmore was constantly in touch with the Trustees in perfecting their plans. Thus his impress was made upon the dimensions and general plan of the complete building, the proportions, lighting and original casing of the first section (now known as the North Wing) and he was concerned with the acquisition and first installation of many of the early collections. On May 11, 1885 he was elected to the Board of Trustees.

The general public came to be most familiar with Professor Bickmore's connection with the Museum through the Department of Public Instruction, organized in 1880 at his suggestion for the purpose primarily of familiarizing the teachers of the public schools with the collections on exhibition by means of lectures illustrated with specimens and lantern slides. From



the humble beginning in 1881 the lecture courses rapidly grew in importance until in 1884 State aid was given to this feature of the Museum work, greatly extending its scope and value. In 1889 a small lecture hall was provided where the present foyer is, and finally appropriations were obtained for the construction of the lower portion of the great central tower designed to be the dominant feature of the completed building. The new section was devoted exclusively to an auditorium seating fourteen hundred persons and was opened with appropriate exercises, October 30, 1900. In the four lecture seasons succeeding this date, Professor Bickmore addressed many thousands of people here, but in the spring of 1904 ill health forced him to retire from the platform and from active participation in the affairs of the institution to which his energies had been unsparingly devoted for more than thirty-six years.



THE CHILDREN HAVE FAVORITE EXHIBITS

## THE EDUCATIONAL VALUE OF THE AMERICAN MUSEUM OF NATURAL HISTORY

*By Maurice A. Bigelow*

Professor of Biology, Teachers College, Columbia University

THE most discouraging fact concerning our boasted modern science is that its great teachings full of meaning for daily life are so slowly filtering down from the investigators to even many well-educated people, not to mention the great masses with limited or no formal education. We need a rapid expansion of facilities for the promulgation of scientific knowledge among the people. This means a movement along two lines: first, there should be greater attention paid to science teaching in schools and colleges; and second, there is need of a science extension system reaching out to those who have already passed beyond the direct control of regular educational institutions. In both of these lines science museums have an opportunity for playing an important part. They may be valuable supplementary aids to the science studies in educational institutions, and they may be the people's university of science for the diffusion of scientific knowledge among those not directly reached by teachers.

Now it must be evident to even a superficial observer that in order to be of such educational value, a science museum must be far different from the old-time collection of natural objects arranged systematically. There must be a limited amount of systematic arrangement, for some idea of system is an essential part of scientific education, but the great view of modern science which the general public needs is only in very small part taxonomic. It must, on the contrary, be chiefly a view of science in relation to modern life in its combined intellectual, practical and æsthetic outlook. Therefore a science museum with educational aims must be planned to present the great principles (such as evolution) which make an intellectual appeal; it must teach the applications of science to practical life (that is, germ diseases, economic animals and plants); and it must increase the æsthetic appreciation of nature and nature's processes.

Such are the chief opinions as to the educational functions of a science museum as seen by an outsider who is interested in nature study and general science with reference to popular educational movements. Such views lead to recognizing that museums have two distinct functions, one the scientific work looking toward an increase in the sum total of knowledge, and the other concerned with selecting and diffusing among citizens young and old the main facts and ideas wherein science definitely touches human life. This means that we need either separate museums of two types, or two organizations within one museum. Obviously the latter is the ideal and

economical plan, for numerous specimens may at the same time serve both scientific and educational ends, and the specialists attracted by opportunity for scientific work may also be excellent directors of the educational activities in their own lines.

If I were requested to name a museum which illustrates in its working the above ideas regarding educational functions and organization, I should at once think of the American Museum of Natural History as of far greater value in public education than any other of the great natural history museums of America and Europe. In no other museum have I been able to find so much evidence that the administrative authorities are deeply interested in public educational problems. This is shown in many ways, in four very prominently: First and most strikingly in the immense number of specimens mounted and arranged so as to emphasize the points of greatest interest to the general public. Splendid examples of this are the bird groups, certain groups in the vertebrate paleontological halls, and the Darwin Hall. Another evidence is shown by the method of labeling. The value of an exhibit depends largely upon explanatory labels. A museum with simply the names on specimens does not deserve to be classed as of noteworthy educational value. The third important evidence is found in the very liberal space allotted to specimens and groups of specimens which are likely to be of popular interest. To reduce the interest of the non-scientific visitor there is nothing so successful as crowding specimens into cases and cases into limited floor space. The few dozen bird groups set prominently in open spaces at the American Museum mean more to the general public than would a very great number of such groups crowded together in order to exhibit a complete ornithological collection. And lastly, the fourth evidence that the American Museum is interested in public education lies in its direct attention to the teachers and students of nature study and biology of the New York City public schools. This would have been considered by an old-time curator as an unpardonable digression from the proper work of a museum.

This development of the American Museum during the past ten years into an efficient educational institution is a matter to which New Yorkers are just awaking. And it would seem that the educational greatness of the Museum has only begun. With coming new buildings and above all with improved transit arrangements which will make the building more readily accessible from all parts of the greater city, the American Museum is sure to develop into full completeness its possibilities as a great educational institution in addition to its function as a scientific one.

## CORDIAL RECOGNITION OF THE MUSEUM'S WORK

### I. MUSEUM AND HIGH SCHOOL UNITED FOR HEALTH AND ECONOMIC WELFARE

*By George W. Hunter*

Teacher of Biology in the De Witt Clinton High School

AS a high school teacher of biology I cannot speak with sufficient praise of the work of coöperation already in force between the American Museum and New York City high schools. Our courses in biology have decidedly a civic trend, biology being applied in its relation to human welfare and especially to the welfare of the citizen of New York. The collections then which bear on the health and economic welfare of the nation are the collections which we as high school teachers most use.

The value of the Museum to us is threefold: first, in our study of collections at the Museum; second, in attendance on lectures which fit into our course, and third, in the use of loan collections.

Under the first heading the De Witt Clinton High School plans several trips during the year; one for the general survey of the Animal Kingdom — for this purpose the synoptic collection in the Darwin Hall is used; then a trip to the insect collections for the economic relation of insects, the mosquito models in the Darwin Hall being used for this also. A third very important trip has been worked out for the bird groups which are used to teach the meaning of adaptation.

To a less extent we use the collections of mammals of New York State, the fishes and the Jesup Collection of Woods. One of the greatest aids will come when the new department of hygiene prepares its exhibits. Last year, for example, we visited the Sewerage Commission Exhibit and listened to an admirable lecture on sewage disposal. That kind of coöperation counts much for the making of citizens.

### II. THE MUSEUM INCREASINGLY HELPFUL FOR TEN YEARS

*By Lillian Belle Sage*

Teacher of Biology in the Washington Irving High School

SINCE my connection with the New York City schools in February 1902, we have in various ways used the Museum with relation to the biology work. For two years we arranged a regular course of lectures at the Museum, the Museum authorities giving us the use of the lantern, someone to run it, and the use of some room. So popular did the lectures become that a third year we joined the other high schools of the



Studying the sugar maple in the Forestry Hall. Much of the education of the Museum leads directly to interests in country life

City and had a series of lectures given by officers of the Museum, and the auditorium was crowded. We found however that to listen to a lecture and visit the Museum itself in one day was not satisfactory, so for the past two years we have had each class visit the Museum three times during the year. A teacher always accompanies the class and each pupil before starting out is supplied with a set of questions which are to be answered from observations made there. I find this method most successful for we go directly to work with questions, specimens, note-book and pencil and no time is lost.

Our first-term students visit the Jesup Collection of Woods; those of



PHOTOGRAPHS OF ONE OF THE CIRCULATING SCHOOL CHARTS PLANNED BY THE DEPARTMENT OF PUBLIC HEALTH TO TEACH THE PREVENTION OF INFECTIOUS DISEASES

The explanatory matter of the charts is very simple and non-technical, as the following:

"Many sicknesses, and particularly those which are catching or communicable, are caused by living germs which grow in the body as a mold grows in jelly and make poisons that cause sickness and sometimes death. These germs are harmless-looking things like microscopic sausages, so small that millions might lodge on a pin point; yet they are the cause of tuberculosis, diphtheria, typhoid fever, cholera and many other diseases.

"The germs of disease are spread from the sick person or the 'carrier' to the next victim by various means. For example, these girls are doing sums with one pencil, which each in turn without thinking puts into her mouth, so that any disease which either may have will be likely to spread to the other through the transfer of the germs from the mouth."

the second term make two trips, one for insects and a second for birds and comparative work on vertebrate skeletons. The girls write an account of their visit and their papers are discussed in class the day following. It must be said that the collection showing life histories, economic value and relationship of insects could not be improved for the purpose of supplementing our teaching, and that the new frog group is one of the best exhibits in the whole Museum as adapted for correlation with our high school biology.

The Museum has loaned to our school cases of insects, birds and invertebrates, which we have found of great value. A set of pictures, prepared under the direction of Dr. Winslow, was loaned to us last year and we used it with more than six hundred girls. The pictures showed plainly the common carriers of disease and how infectious diseases can be prevented.

In my last visit I brought a blind girl and enough cannot be said of the assistance she received. She gained her first accurate idea of the mammals and birds about which she had read and heard. The Washington Irving biology girls soon get the "Museum habit," for once their attention is directed there, they go often and interest others, especially members of their own family.



"Our own hands are almost as likely to carry disease germs as are those of anyone else, for in the day they touch a hundred things which someone else may have infected. This is why the thorough washing of the hands before eating is so necessary." [From circulating school chart]

### III. THE MUSEUM A LABORATORY FOR CLASSES

*By Anna M. Clark*

Head of Department of Nature Study and Science, The New York Training School  
for Teachers

THE studies made by our students at the Museum are a very important part of our nature study course. Four class trips at least each year are made for the purpose of studying the invertebrate groups in Darwin Hall and the birds, insects and minerals.

The Museum gives a far broader view than it is possible for students to get from their own outdoor experiences or from such collections as the school provides. A carefully planned museum lesson, calling for the solution of definite problems, affords the benefits usually following any laboratory work.

We have used the Habitat Groups of Birds to show types of bird life in various parts of the world and how birds are adapted to different environments; the insect collections chiefly in connection with the study of economic forms. We have used the collection of precious stones to show forms of unusual beauty in which many common minerals occur, and the collection of New York City rocks and minerals to aid in the identification of such minerals as we ourselves find about the city as well as to supplement our observation work on them.

#### IV. HOW ONE CROWDED HIGH SCHOOL USES THE MUSEUM<sup>1</sup>

*By James L. Peabody*

Teacher of Biology in the Morris High School

EVER since the Morris High School was organized in 1897 its biology teachers have found the American Museum a most valuable source of instruction and enjoyment. In the early days before the numbers of students in our classes became so great, most of the teachers of biology went to the Museum with each division of students to study trees, or birds, or insects, or skeletons. Not only did this study supplement the work of classroom instruction, but it also furnished the best of opportunities for the teacher to know personally the boys and girls in his classes.

With the increased complexity in school organization those class trips have become more and more impracticable, and we have therefore set apart two days in each half-year for biological excursions to the American Museum. On Friday of the week devoted to school examinations, the four to five hundred boys and girls in Biology II (Animal and Human Biology) go to the Museum on a special train provided by the Interborough, accompanied by the ten teachers of biology. They assemble in the large lecture hall, where they listen to an illustrated lecture on the characteristics and economic importance of birds with methods of bird protection. A definite study is then made of the bird groups and of the various types of animals in Darwin Hall, the students being guided by an outline which they fill in

<sup>1</sup> Mr. Peabody furnished with this statement of the work of biology classes in the Morris High School, copies of the outlines used and questions to be answered in the Museum lessons on woods, birds and invertebrates. These seem of such practical value and general interest that it is regretted lack of space prevents their publication in the JOURNAL.—The Editor



and file with the teachers on leaving the Museum. At school the next two or more days are devoted to a discussion of the lecture and the observations made of the animal groups. In a similar manner, on Monday of Regents' week, the five to six hundred pupils in Biology I (Plant Biology) meet in the lecture hall and listen to a lecture on "Forests and Forest Preservation." The remainder of the morning is devoted to a study of the Jesup Collection of North American Trees, when the students fill in the blanks of an outline. Certainly the public schools of New York City will do all they can to develop appreciation of the enjoyment and knowledge furnished so prodigally by the world's greatest museum for popular instruction.



Pupils from the High School of Commerce before the malarial mosquito exhibit.

In a museum the visitor may seek out that subject in which he is most interested and thus lay a foundation for a life work or recreation.

Classes from the High School of Commerce visit the Museum not only for the subject matter of the exhibit but also for a study of methods, the work of glass blower, clay and wax modeler and of other craftsmen in the preparation laboratories.

# THE AMERICAN MUSEUM AND EDUCATION

A SERIES OF SIX ARTICLES BY MEMBERS OF THE SCIENTIFIC STAFF OF THE  
MUSEUM ON CERTAIN PHASES OF THE INSTITUTION'S EQUIPMENT FOR  
EDUCATIONAL WORK

## I. COÖPERATION WITH THE PUBLIC SCHOOLS

A system of Museum Extension in loan collections and lectures and provision within  
the building for expert guidance and instruction of classes

*By George H. Sherwood*

WHILE education is the fundamental principle underlying all modern museum exhibition and the collections of the American Museum from its foundation have been a source of information to teachers, certain definite steps have been taken within the last ten years to bring about a closer relation between the Museum and the public schools. To carry out this purpose, especial facilities are offered teachers and pupils in order that they may have the freest use possible of the educational material which the Museum possesses.

The introduction of nature study into the courses of study of the public schools, combined with the growing general interest in out-of-door life, has given the Museum an opportunity through its circulating collections to become of much practical use to the teachers.

Using as a guide the syllabus of nature study issued by the Board of Education, the Museum prepared some years ago several hundred collections





of natural history specimens for circulation in the public schools of New York. The purpose of these collections was to place in the hands of the teachers the material that was needed to present properly the subject of nature study.

Each collection is accompanied by a leaflet giving facts on the structure, habits and characteristics of the particular species in the collection. These notes are necessarily brief and are intended chiefly as suggestions to teachers. A bibliography of the subjects treated is appended to each set of notes.

From small beginnings this work has grown until to-day nearly four hundred schools, some of which are twenty-five miles from the Museum, are receiving the collections regularly. At the present time the circulating collections that are available for loan to schools and the grades to which each is adapted are as follows:



Schools to visit a special exhibit at the Museum

*Native Birds. Adapted for Grades 1A-4B*

Owl Set — Containing owl, chickadee, nuthatch, song sparrow, kinglet

Blue Jay Set — Containing blue jay, woodpecker, crossbill, junco, English sparrow

Robin Set — Containing robin, red-winged blackbird, oriole, meadow-lark, chipping sparrow

Bluebird Set — Containing bluebird, phoebe, barn swallow, house wren, chimney swift

Tanager Set — Containing scarlet tanager, red-eyed vireo, goldfinch, hummingbird, pigeon

*Insects. Adapted for Grades 2A-5A*

Containing cynthia and cecropia moths, monarch butterfly, etc., and typical representatives of the different groups of insects

*Special Insects. Adapted for Grades 2A-5A*

Containing life history of cecropia moth, development of monarch butterfly, life and work of honey-bee and household insects

*Mollusks. Adapted for Grades 4A-5A*

Containing shells of about twenty-five mollusks, including specimens of the oyster clam and chambered nautilus

*Crabs. Adapted for Grade 5A*

Containing relatives of the common blue crabs

*Starfishes and Worms. Adapted for Grades 4A and 5A*

Containing typical species of the two groups

*Sponges and Corals. Adapted for Grades 4A and 5A*

Containing about fifteen species of corals and their relatives

*Minerals and Rocks. Adapted for Grades 3B and 4A*

Containing twenty specimens of minerals and building stones.

*Native Woods. Adapted for Grades 2A and 5B*

Containing elm, hickory, oak, maple, white birch, ailantus, sweet-gum, sour-gum, chestnut, sycamore. Specimens show cross, longitudinal and oblique sections of the wood, characteristic bark, annual rings, etc.

The method by which the teacher obtains the collections has been made as simple as possible. The Museum furnishes blanks upon which principals make application for the collections and at the same time indicate the sequence desired. Delivery is then made by the Museum messengers who call again at the end of the loan period, i. e. every three or four weeks, and make the second delivery. The wisdom of making these collections loans instead of gifts has been repeatedly demonstrated. This method keeps the Museum in frequent touch with the teachers and enables us to understand their needs better.

It is of course at the Museum that we are prepared to extend more varied aid to the teachers. To facilitate the work of reaching the Museum, the Museum in coöperation with its sister institutions of the city, has issued a large map of New York City showing the locations of free educational institutions and the main transportation routes by which they are reached. A copy of this map has been presented by the contributing institutions to every public school in the city and its examination will simplify the task of visiting the Museum.

By making an appointment a few days prior to the visit to the Museum an instructor will be provided who will guide the teacher and her pupils through the halls, calling attention to the lessons taught by the exhibits. Such visits may also be arranged in series to supplement classroom work and may be preceded or followed with lectures by the instructor on the subject under study. Through the aid of the instructor classes are enabled to make the best use of the time spent at the Museum.

In some instances teachers prefer to give their pupils special talks or lectures. For this purpose the Museum has several small classrooms equipped with chairs, tables, blackboards and stereopticon which will be reserved on request. In one of these rooms a teacher would be as much undisturbed as in her regular schoolroom.

The Museum possesses more than thirty-five thousand lantern slides, of which about twelve thousand are colored. The field parties which the Museum is sending to remote parts of the earth bring back photographic

material, which enables us to make continual additions to this series of slides. The views illustrate plant life, animal life, industries, customs of people, and physical geography. While these slides cannot be loaned for use outside the building, teachers may select slides to illustrate a desired lecture which may be delivered in one of the Museum's classrooms.

It is from this source of supply that we draw the material to illustrate the informal lectures which are given to school children. These courses were first suggested by the New York City Teachers' Association in 1904. Since that time they have been given regularly in the spring and fall. The subjects are chosen with especial reference to the courses of study given in the syllabuses for history, geography or nature study, and are designed to supplement the classroom work of the teachers. Announcements of our courses of lectures are mailed to principals, and teachers file reservations for seats in the Auditorium on blanks furnished by the Museum.

The broad scope of the educational work of the Museum is indicated in the action of the Trustees in recently authorizing the equipment of a room especially reserved for the use of the blind. As yet only a small beginning has been made, but specimens of animals and Indian implements have already been set aside and labeled in raised type. The development of this feature of the Museum's activity has been amply provided for through the bequest of Phebe Anna Thorne and the generosity of her executors, who have endowed the work as a memorial to Jonathan Thorne.

It is safe to say that no visitors to the Museum obtain a greater enjoyment from the collections than do the various groups of blind people, who may often be seen in the exhibition halls.



Two compartments of a traveling case showing junco and blue jay on their way to the children of some primary school. The Museum has prepared several hundred traveling cases of birds

## II. FOSSIL VERTEBRATES - WHAT THEY TEACH

By W. D. Matthew

"The plan of the department [of Vertebrate Paleontology] as outlined by Professor Osborn in the Annual Report for 1892, was to...present a historical development of the Evolution of the Mammals in North America. It was expanded subsequently to cover the evolution of the vertebrata in general, but its chief aim...has been to present the Evolution of the Land Vertebrates, primarily of North America, but incidentally of other parts of the world." Extract from the *History, Plan and Scope of the American Museum of Natural History*

THE history of vertebrate life in North America: this is the fundamental concept in the exhibits of fossil vertebrates which occupy three great halls on the fourth floor, east wing, of the Museum.

Paleontology, it has been said, is but history writ large. It is the history not merely of man, but of all life, projected backward into a dim past whose distance dwarfs to insignificance the few centuries of recorded human events. In the history of mankind the modern view no longer regards it as a mere chronicle of successive events and disconnected episodes, but seeks to trace the orderly and continuous development of primitive races and conditions into the complex and elaborate civilizations of the present day. The rise and fall of dynasties and kingdoms, the progress and decline of races, their migrations and interaction on each other, the qualities of mind and body and conditions of circumstance and environment which bring about the sequence of historical events, all play their part both as cause and effect, and each event is considered in relation to the causes which preceded and the effects which followed it.

So too in this larger history which traces the orderly development of life through the vast periods of geologic time. The continuity of life, and its evolution under the impulse and control of natural law from primitive beginnings to its present variety and complexity — the doctrine of evolution in its broader sense — is the keynote of modern paleontology.

In a historical museum we expect to find the documents, or some of them, on which history is based. Some of the more important are on exhibition, arranged and labeled so as to show what they mean. Most of the records and documents are preserved in storage, catalogued and arranged and made accessible to students. So with the documents of paleontology, the fossil skeletons, teeth and bones which record the former existence of animals now extinct, and the earlier history of the races which now people the earth. The more important specimens are placed on exhibition and are provided with labels and diagrams. The great mass of the material is in storage, accessible to scientific students.

The three large halls devoted to fossil vertebrates represent in a broad way successive geologic eras as marked out by their dominant forms of life. In the central hall are placed the mammoth and mastodon, the great ground sloths and other extinct giants of the Age of Man, with whom our prehistoric ancestors disputed the dominion of the earth.

To the east is the Tertiary Mammal Hall showing the evolution of the different races of modern quadrupeds during the Age of Mammals, before man had emerged from the obscurity of his pre-human existence. Here in successive alcoves are palaeontological "documents" which illustrate the past history of the different kinds of modern mammals, as interpreted and explained by labels and diagrams.

By far the most complete of these exhibits is the alcove showing the Ancestry of the Horse. In other alcoves are illustrations of the geologic history of the camel and other ruminants, of rhinoceroses, tapirs and carnivora, and at the farther end are shown such episodes in the Tertiary history of North America as the rise and fall of the *Uintatheres* and *Titanotheres*, dynasties of extinct giant races which have left no living descendants. But in a broad way the Tertiary Mammal Hall shows the evolution of the higher quadrupeds, the building up of the animal world of to-day.

In the Dinosaur Hall we pass into an older world. As in a museum of antiquities we may pass from the halls devoted to the records of the up-building of our modern civilization into those displaying the relics of an older civilization upon whose ruins it is built, so here we pass from the Age of Mammals into the Age of Reptiles, the era of the dinosaurs—gigantic extinct reptiles which were the dominant land animals of that far distant time. They are but remotely related to the living lizards, crocodiles, snakes and turtles, poor and unassuming cousins who have survived the downfall of the giant reptilian lords of the Mesozoic world, and continue even to-day to play their modest part in the economy of nature. The unfamiliar and bizarre proportions and often gigantic size of these Dinosaurs make them the most interesting and impressive of all extinct animals. As yet, their history is imperfectly known, and neither the materials nor the space allotted for their display permit us to show the successive stages in the evolution of the different dinosaurian races. In the far corner of the Dinosaur Hall are the records, still less complete, of a more ancient period, the Age of Amphibians, which preceded the Age of Reptiles; and in the small southeast Tower Hall are the relics of the Age of Fishes which in turn precedes the Age of Amphibians.

With the building of the projected extensions of this wing of the Museum the space allotted to these older periods of earth history will be expanded, so that the visitor will see displayed in successive halls the records of the Age of Fishes, the Age of Amphibians and Coal plants, the earlier and later periods of Dinosaur supremacy, and then, passing through the Evolution of the Mammals, will finally reach the Age of Man in the central hall. The materials for filling these successive halls are rapidly accumulating through the efforts of successive expeditions financed by the President and Trustees of the Museum.

### III. THE HABITAT GROUPS OF MAMMALS AND BIRDS

*By J. A. Allen*

THE group exhibits illustrating the life habits and natural environment of mammals and birds in the American Museum of Natural History now exceed one hundred and fifty in number, and nearly half of them, in respect to scope, size and accuracy of detail, are admittedly more elaborate than any similar exhibits in other museums. The construction of the smaller groups began some twenty-five years ago, and later much larger groups were undertaken. In more recent years similar exhibits have been installed in other American museums, making a more or less general departure from the century-old methods of museum exhibition that prevailed generally almost to the end of the nineteenth century.



The educational advantages of these groups consist in their realism. The Bison Group, with its area of fifteen by thirty feet, represents a characteristic bit of the Plains, the former typical home of the American bison (misnamed "buffalo"), and includes not only the original sod covered with real "buffalo grass," but also a real buffalo trail, a weathered bison skull, and bunches of cacti, besides an old bull and cow, a young calf and young bulls of different ages, the ensemble illustrating most impressively and accurately the actual appearance of this animal and its home surroundings. Large explanatory labels give briefly its history, while on accompanying maps is shown the vast area of its original range and the gradual restriction of this range to the few points where it still exists, in limited preserves under governmental protection.





The Museum provides instructors to guide teachers and classes, explaining at request exhibits that correlate with classroom work

The Moose Group, on a similar scale and with equal detail and realism, illustrates the life history of the largest game animal of America, with its entirely different habits and haunts. The elk, the Barren Ground caribou of the Alaskan Peninsula, the musk ox of Arctic America, the white sheep of the northern Rockies, the Atlantic walrus and the Alaska fur seal, are each placed before the visitor in a way to illustrate impressively their habits and the conditions under which they live. All of the mammals characteristic of New York State, except the field mice, shrews and bats, are similarly illustrated, so that the children of New York City have thus the opportunity to see and become in a way familiar with the principal mammals of New York, many of which they would never see in life, and of none of which would they ever be able to obtain more than fleeting glimpses in a state of nature.

The bird groups, with their panoramic backgrounds and elaborate treatment, now occupying the entire gallery of the north wing of the Museum, possess an educational value not easily overestimated, illustrating as they do the principal types of North American bird life in a way to bring vividly before the visitor not only the habits and haunts of the species represented, but also the types of country they inhabit. They are

thus highly educational from the standpoint of geography and climate, as well as eminently pleasing aesthetically. The accompanying descriptive labels supply the necessary information to render the groups easily understood.

The interest and value of this visual instruction to the children of the schools is best appreciated by witnessing the avidity with which they scan these elaborately presented glimpses of bird and mammal life, these bits of nature transferred to the museum where they may be studied in detail and at leisure.

#### IV. EDUCATIONAL AIMS OF THE DEPARTMENT OF INVERTEBRATE ZOÖLOGY

*By Henry E. Crampton*

THE student of living nature invariably becomes acquainted at first with the larger animals, those possessing a backbone, such as the beasts of the field and forest, the birds of the air, and aquatic forms like fishes and amphibia. Not until later is his attention challenged by the myriads of smaller animals devoid of backbones, and hence called invertebrates; only a few kinds of insects, crustacea and edible mollusks come to notice without being sought in their natural homes. Yet many of them are related to man in such ways that his health and welfare depend upon a knowledge of their habits and life histories and moreover, from the educational standpoint, the value of their study is extraordinarily high because their forms are more varied than those of vertebrates.

It is the task of the Department of Invertebrate Zoölogy to display characteristic examples chosen from the wide array known to science, and also to demonstrate the countless ways in which the lives of these low forms are intertwined with other animal life and directly touch human interests.

In addition, an insight into nature's all-inclusive process of evolution is so valuable that this too must be presented in educational exhibits of the relationships of animals to one another and to their surroundings as well.

In the Darwin Hall, specimens and models illustrating significant forms among the principal groups of the Animal Kingdom are arranged in the order of their relationship from the



A hive of live bees in the Insect Hall

lowest to the highest. Many of these forms are so minute in life that a glass or wax model must be made with a magnification of more than a thousand diameters in order to show the delicately beautiful structures. To make these systematically arranged specimens upon the shelves more instructive, correlated groups are planned—some have been constructed and others are in progress of construction—to show how the animals really live, how worms burrow in the sand and mud along the ocean's shores, how crabs and starfish meet their conditions of life (Cold Spring Harbor Group) and how swarms and clusters of lower animals crowd upon the piles of a wharf. While in the center of the hall are groups that illustrate greater principles of science and wider biological relations—for



Model for a new group to show the plants and animals that live at different depths in the sea gardens about old wharves. Such a group teaches many facts and principles of biology

instance, a field mouse with its enemies on the one hand and its prey on the other — is an example of the struggle for existence.

The Hall of Mollusca aims to do in detail for one division of animals what the Darwin Hall outlines for all. Here an extensive array of shells is placed, together with exhibits showing how important some species are to man, such as the pearl oyster with its pearl-fishing industry, and the common oyster and the clam with their culture and industries.

The Hall of Insect Biology and Local Insects has a double function. In it are deposited larger collections of insects found within fifty miles of New York so that a student can bring his own collections for comparison and identification. Here, as in the Darwin Hall, larger principles are demonstrated, such as variation of the members of a single species, the differences between insects of forests and of plains, the results of experimental investigation of heredity, and the like. During the past summer there have been in the hall special exhibits of the seventeen-year cicada and of live bees at work in a hive.

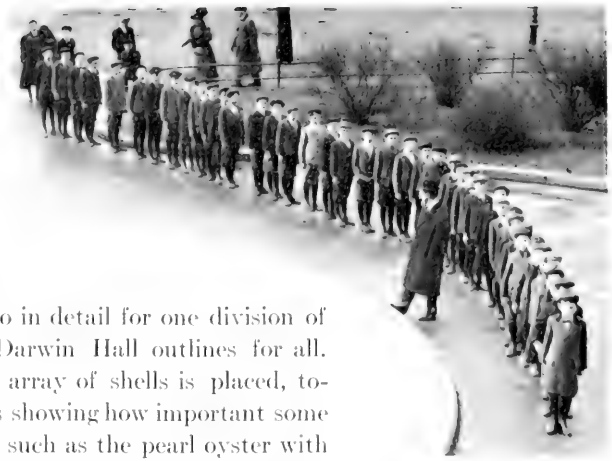
## V. THE MUSEUM LIBRARY

*By Ralph W. Tower*

THE Library of the American Museum has been in existence since the founding of the institution but not until very recent times has it kept pace with other departments. During the last decade however, enthusiasm has increased, some scientific societies have deposited their books in the Museum's custody and altogether a serious attempt has been made to make this library one of the most comprehensive and complete of its kind in America.

Library progress in general has been very rapid in America in recent years and one of the most important developments in this progress has been the rise and growth of the "special library," particularly the one whose purpose it is to serve the public in a free and unrestricted manner.

A special library relating to natural history appeals not only to the specialist whose needs demand accurate and detailed descriptions but also to a very large proportion of the public where the desire is for more general



information; for very frequently has the business man, the professional man, the man of leisure, the artist, the inquiring youth found the keenest enjoyment and relaxation in gaining expert knowledge on some subject in natural history. And where would he rather find a well-equipped library in this domain than in a large public museum supplied both with the specimens and with the literature pertaining to these specimens.

In the Museum's library of 60,000 volumes are some 15,000 volumes devoted to zoölogy, containing the works of Audubon, Gould and Chapman in ornithology, an excellent collection of 3500 volumes relating to insects, and a 2000 volume collection in conchology embracing the classics of Küster, Reeve and Binney. There is also a well-selected library of 2500 volumes in anthropology containing many of the rare and older works relating to the North American Indians; an excellent collection of 3000 volumes in geology, enriched by the library of the late Professor Marcou; a collection of 5000 volumes in paleontology to a large extent composed of the Osborn Library of Vertebrate Paleontology, and besides, an unusual collection of more than 20,000 volumes of natural science periodicals.

It is doubtful if the educational value of a free special library of this kind can be overestimated. In few other fields is it possible to bring together the material subject and the literature as under the roof and administration of a great natural history museum.



Describing catalpa flowers (wax reproduction) in the Forestry Hall

A natural history museum presents the combination of laboratories filled with material for study and a library covering the literature of this material

## VI. THE ARRANGEMENT OF EXHIBITS IN THE HALLS OF ANTHROPOLOGY

*By Clark Wissler*

IT is fitting that a natural history museum should show something as to the natural history of man and in accordance the anthropological halls of the Museum exhibit samples of handiwork illustrating, as we say, the cultures of the less civilized races. We fear however that few who visit our halls really understand the principle upon which the specimens are arranged. If you ask one what any of our biological halls represents the answer is as instantaneous as a reflex — evolution. If you ask a biologist what an anthropological hall should indicate you receive the same answer — the evolution of man and his culture. Yet, if you ask the anthropologist he is somewhat at a loss for a definite term or phrase to express the idea, for while the whole biological world is almost unanimous that evolution is for it the one working hypothesis, the anthropologists of Europe and America are by no means agreed except in that the origin and historical development of culture is the fundamental problem. Animal life is the biologist's problem until that life takes the shape of man whence the classification becomes the anthropologist's problem. Since with the exception of a few very ancient skeletons however, all men seem to constitute a single biological species and cannot readily be arranged in a series of descent according to ancestry, the chief interest of anthropologists has been in habits and customs, or culture. While most museum anthropologists will agree that exhibits should be so ordered as to show the origin and historical development of culture, they are confronted with no generally accepted theory of development according to which museum material could be arranged. Hence they all fall back upon a geographical scheme of classification.

As our halls now stand we have on the ground floor five of the great culture areas of the American Indians — the Eskimo, the North Pacific Coast, the Eastern Woodland, the Great Plains and the Southwest. On other floors are halls for Asia, Africa, the South Seas and South America. The ancient races are represented in the Mexican and general archæological halls. Such an arrangement has this virtue, it presents man in approximately the time and place relation he really occupied at the date of observation.

Many of our visitors, especially teachers of children, are interested in the developmental sequences, such as methods of fire-making, house construction, and stone and metal work. On all such points illustrative material will readily be found in the various collections. If one is interested in houses, many types will be found in the exhibits for the different geographical areas. If one wishes to formulate a theory as to how the various types

develop, he is at liberty to do so and will not find his flight impeded for lack of insight into the true relation of things, for should a museum officer decide this point for himself and select out all the house models for exhibition in a single hall, arranging them according to his notion, the visitor could not see each type in its proper cultural setting. The point however is this: scarcely any two anthropologists are agreed upon any one of such sequences and until they are, or until the facts available make a definite conclusion inevitable, it is impossible to have other than a geographical arrangement in our exhibition halls. There are, of course, some very fundamental problems now occupying the minds of anthropologists, but their working hypothesis is a geographical classification of cultures rather than an evolutionary hypothesis.

The general cultural value of such comparative studies as methods of fire-making and house types is obvious. In the case of fire-making, we have real historical data on the evolution of matches, and know that they were preceded by flint and steel and wood friction. We are not quite sure that wood friction was first, but think it safe to assume as much. Beyond this we cannot go, but we feel that the child who sees the various methods demonstrated in school and sees real specimens in museum collections, is likely to grasp some fundamental principles of practical life as well as the significance of certain physical and chemical conceptions. The same is true of house types, canoe types, hatchet types, food types, and every other phase of culture.



#### A SYMPOSIUM OF EXPRESSIONS FROM PRIMARY AND GRAMMAR SCHOOLS

THE following quotations representing a few of the many letters received from principals and teachers of the Public Schools can but make the Museum humble before the vastness of its opportunity, the far reaching of even the smallest effort put forth, and again proud that the American Museum was the institution to which came the rare fortune of developing the working system of coöperation with the schools.

The Museum holds an unusual opportunity as providing free and pleasurable instruction in the heart of New York. Moreover, it is an insti-

tution untrammelled by courses and requirements, or rather it has all courses elective so that the child may seek out that subject in which he is most interested to lay unconsciously the foundations of a life work or recreation. For feeling and intellect act together in the child and the more spontaneous the interest the more deep-rooted and lasting the impression. Thus it is gratifying to see in the letters from the schools frequent reference to the liking that children have for the collections and the trips to the Museum.

It is good also to find many allusions to the fact that children carry home the news of their experiences and bring their parents "to see the Museum" too. This unites the younger and the older generations by a tie of common knowledge and interest.

Two features of the institution's educational work are peculiar to a museum and due to its organization: first, that it furnishes pleasurable instruction which is non-compulsory as to time and subject, being moreover important as knowledge toward better living; and second, that it furnishes such education to young and old *together*, thus forming one small bond for united family life under city conditions where there is great need of such influence.

#### THE MUSEUM HAS JUSTIFIED ALL IT COST BY WHAT IT DOES FOR CHILDREN OF ELEMENTARY SCHOOLS

##### *Public School No. 50, Manhattan*

I have not seen equalled in any European country the hospitality with which the Museum has opened its doors to the children, providing guides to escort them through the building. The children have been intelligent and eager listeners to the lectures, and have always returned to school the following day enthusiastic over their experience, which provided an outing for many whose lives are not often gladdened, while affording instruction as well as rare pleasure.

It has been the good fortune of Public School No. 50 to have lecturers like Mr. Sherwood and Mrs. Roesler come to the children in their own school and show them, from specimens sent by the Museum, the characteristics of many birds whose notes they reproduced to the great pleasure of the children. It is a "red-letter day" in Public School No. 50 when a new case of specimens arrives and is exhibited to the children.

We feel that the Museum would have justified all that it has cost if it were only for what it does for the children of the elementary schools.

#### A SINGLE CHERRY FLOWER

##### *Public School No. 36, Brooklyn, Grade 3B*

The flowers and twigs distributed by the American Museum of Natural History last spring were of great interest to the children. A bud on one of the cherry twigs opened in my classroom, and the children, who had never seen a cherry blossom, were delighted to see and smell the little white flower.

#### THE BIRD COLLECTIONS A REAL ENJOYMENT

##### *Public School No. 113, Manhattan*

I do not know how we ever had any bird study down in this section of the city before the Museum began to lend us the collections of birds. Now we have not only the study of the birds but the children draw them in color, thus doubling the enjoyment. I keep the birds near my office door and no child passes without giving a good long look in their direction.





Editorial note. Lack of space in the *JOURNAL* has postponed the publication of many interesting letters sent by school children. Who could speak of the Museum's help with a meaning less obscure than in the following:

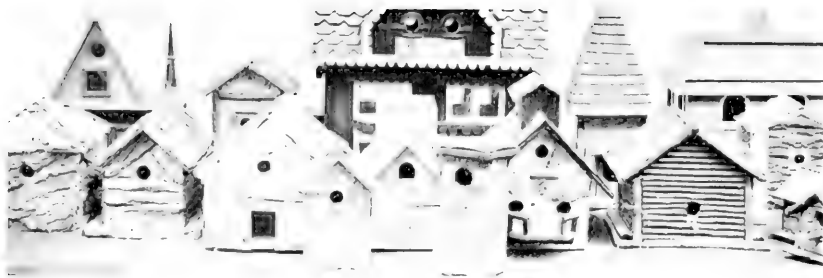
"Last month I was down to see the Natural Museum History for the tenth time. I was very glad I went, because when my teacher ask to describe a insect, bird or anything I could stand up and answer all her questions correctly. When the class was tested I received a hundred per cent paper.

I can assure you if anybody who is interested or wants to learn nature to go down to the Natural Museum History"



VISITING THE MUSEUM ON A HOLIDAY

On Columbus Day boys came on their skates long distances to see the picture of Columbus. Some of these photographed came from 169th Street, East Side, Public School No. 2, and from 146th Street, Public School No. 186



*Photo by George Gude*

Bird houses made by boys of Public School No. 5, The Bronx, on the basis of collections sent by the Museum

### MUSEUM HELPS BOYS TO MAKE BIRD HOUSES

#### *Public School No. 5, The Bronx*

The collections of birds that the Museum sends out to the public schools have proved very helpful in the matter of furnishing concrete evidence of the size of birds the boys of Public School 5, The Bronx, decided to build houses for.

The school has always made much of Audubon's birthday, which comes about the same time of the year as does Arbor Day, and the pupils have taken a lively interest in the fate of the birds that used to be so numerous about the Bronx. Therefore when it was suggested that the boys make bird houses to put up in the yards to coax back some of the wanderers, the notion was taken up enthusiastically. The teacher of constructive work in the upper grades sent for the collections of birds as they came to the school and allowed the boys to judge of the size and appropriateness of the houses for the various birds. They read in suggested books about the kinds of birds that lived in artificial abodes and searched everywhere for facts concerning the nature of their habitat. It was in accordance with these ideas that they built the houses, save that in some the more ambitious put glass windows in the hope that they might be able to observe the birds actually at work building or brooding.

For the most part the houses were made in hours out of school and with tools of the pupil's own. The school, not being provided with a shop, was ill-equipped for the furtherance of any very elaborate work, but the untiring zeal of the instructor made the boys eager to work. The results proved to be extremely creditable and boys that had heretofore shown not much evidence of constructive ability, when once they were launched on this lively problem with a definite, concrete goal, developed remarkable skill and ingenuity. Also it must be said that there came from the work as well a moral development of which there was good reason to be proud.

### THE JESUP COLLECTION A STIMULUS FOR WOOD COLLECTIONS MADE BY BOYS

#### *Public School No. 150, Brooklyn*

The children are told of things in nature but rarely have the opportunity of seeing them except through the collections. The class of 5A boys were interested in examining the different woods at the Museum. One boy made a collection of hard woods, which the other boys take great pleasure in studying.

### THE MOUNTED BIRD MEANS MUCH IN THE IMAGINATION OF THE CITY CHILD

#### *Public School No. 76, Manhattan, Grade 2B*

These little people of the second grade, brought up under the abnormal conditions of the city, love the birds of the collection. They smooth and pet them, and even kiss them when I am not watching.

### THE MUSEUM GIVES CHILDREN A GREATER LOVE FOR LIVING ANIMALS

#### *Public School No. 76, Manhattan*

As our pupils live within walking distance of the Museum, they go there frequently. The great attraction for the boys are the wonderful Indian collections. For class use the bird

collections are prime favorites. All our teachers tell me of the pleasure it gives their children to be permitted to touch these specimens carefully and tenderly.

The members of one class of 4B boys were very enthusiastic over the skeleton of Jumbo. This enthusiasm, as usual, found expression in greater love for the living animal, for we learned while a class was planting seed that one little boy had gone to the park during his luncheon hour and planted some seed near the elephants' house.

#### CHILDREN REMEMBER WHAT THEY LEARN AT THE MUSEUM

##### *Public School No. 25, Manhattan*

The knowledge obtained both from the collections sent us and the lectures given at the Museum means much more to the children than that obtained from books. The information is so definite and interesting that it creates a strong and lasting impression upon the minds of the children, and they are thus able to retain it very effectually.

#### A LETTER TO MAKE THE MUSEUM DESIRE TO DO STILL MORE FOR THE SCHOOLS

##### *Public School No. 84, Brooklyn*

Many of our pupils are children who never see the country and who are totally unacquainted with any birds or insects found outside of the crowded city streets. The specimens enable these children to form correct conceptions of otherwise fabulous creatures.

In their own way the children show quite as much appreciation as their teachers. The first question they invariably ask is, "Is it real?" When assured upon this point they are always deeply interested, and very anxious to "feel how soft the bird's coat is!" Each new interest endures as a helpful foundation for further work. Allusions to any subject studied with the help of Museum specimens bring an immediate and intelligent response.

#### THIRTY-SIX MUSEUM LECTURES ATTENDED

##### *Public School No. 184, Manhattan*

Our higher classes have attended thirty-six lectures which helped to fix the grade work, were an entertainment and brought out a pleasant attitude toward their work. Among the favorite lectures were "From Pole to Pole," "Early Days in New York," "Natural Resources of the United States," and "Life among the Indians." These afforded material for geography, history, nature study and language work.

#### WORD FROM A DISTANT SCHOOL

##### *Public School No. 59, Brooklyn*

My school is located at so great a distance from the Museum that it is not possible to send classes there because of the carfare involved. Thus my teachers and I welcome the collections sent to the school, and the children are always delighted to see the boxes and to study their contents.

#### THE CHILDREN OF "LITTLE ITALY OF THE WEST SIDE"

##### *Industrial School No. 5*

When the Museum of Natural History was brought down to Industrial School No. 5, in the shape of suitable collections in sequence for study, it was a good thing for the children of "Little Italy of the West Side," who live so far down town, near Sullivan, MacDougal and West Houston Streets, that they have little opportunity to go to the Museum.

The children like the birds especially and it is remarkable the aptitude with which they learn to know them. The humming bird is a great delight and the solemn owls are studied with round-eyed wonder. Three classes were taken to the Museum last term. Their experiences are always related at home to the other members of the family, and in this way the benefit is far reaching.

## SPRING AND FALL FLOWERS

*Public School No. 36, Manhattan*

The spring and fall flowers distributed at the Museum are a great help to us, for we find it difficult to obtain the specimens required by the course in nature study. I am sure that this voices the sentiment of all the teachers.

## PLEASURABLE STUDY

*Public School No. 27, Manhattan*

The children, even of the higher grades, like the bird collections best of all. A robin collection was sent to a fifth year class. The teacher glanced at the label and said, "Oh, those are birds; they are for the lower grade. Take them downstairs." A boy immediately raised his hand and said, "Can't we study them before they go down?"

In one of the collections is a parrot. It was the children's favorite. One boy in particular took a special interest in Polly. This boy one day offered to stay after three and put chalk and board rubbers away. Later it was found that his motive in staying was not to help his teacher. He wanted the chance to stroke the bird and talk to it. When the time came for Polly to return to the Museum this boy found he could no longer stay in after three.

Trips to the Museum are always looked forward to with pleasure and the children gain knowledge unconsciously. The classes are large, so that a teacher often has to ask some to wait until another time. But it is likely that when those chosen to go reach the Museum, the "not invited" members of the class are there before them and all must be taken under the teacher's guidance.

## THE SCHOOL CHILDREN OF NEW YORK HELP THE MUSEUM TO A GREATER USEFULNESS

*Public School No. 10, Manhattan*

Many of the children know not even of the existence of such a place until they have accompanied their teacher to view some exhibit. Their delight then sends them home to tell parents and friends of their wonderful "find," and again and again they visit the enchanted ground with varying groups of acquaintances. So in their childish way, by making the Museum known to the greater mass of the citizens of New York, they help it to a greater and ever widening realization of its usefulness.

## THE CHILDREN'S ROOM OF THE MUSEUM

*By Agnes Roesler*

THE Children's Room was started in response to the needs and demands of young visitors to the Museum. The original equipment was slight. A few specimens of birds and small mammals, some books, plants, an aquarium and a case containing live snakes constituted the entire material. The children flocked into the room, looked at the picture books, drew portraits of the birds and mammals and asked questions to their hearts' content.

At different seasons of the year temporary exhibits were placed on view. A jar containing mosquito culture was the subject of many talks; frogs and their eggs were collected by some of the boys and formed the subject of an interesting lecture given by a boy of thirteen years. A lecture on Indians is frequently given and illustrated by some of the youngsters dressed in

"real Indian" costumes. The actors bring water-color paints to decorate their faces, and they play their parts with bashful earnestness. Sometimes little figures of animals or miniature Eskimo villages are modeled in composite clay, the sculptors first making a visit to the Eskimo Hall to examine the construction of igloos. To some of the older children are handed lists of questions to which answers must be deduced from observation of the Museum exhibits.

It is now estimated that there are between four and five thousand youthful visitors in the Children's Room during the year. A small group of children comes every Wednesday afternoon, with sufficient regularity to enable us to carry on study further than desultory questions and answers. Among

other activities we read *Swiss Family Robinson* last winter, and investigated every animal mentioned in that remarkable book. A chance remark disclosed the fact that one of these children was "afraid" of spiders, so we set to work to learn all that we could about spiders and to transmute fear into interest. The same course was followed with regard to snakes, and the children handled garter snakes and other harmless species without dread.

The Children's Room is now being fitted out more in accordance with the original plans and is taking shape as a small museum where opportunity is given for carrying on some activity in addition to observation. Permanent exhibits of shells and minerals and one of wonderful fishes are displayed there. Two cases contain a collection of dolls from all over the world, dolls that were made and played with by Eskimo, Indian and Philippine children, and even some that have come to us from a distant past hidden in the graves of ancient Peru.





Teacher and class at the Museum. "The fruit of the Museum's influence often appears months afterward in some reading lesson or conversation"

## TUESDAY AT THE MUSEUM

By Mary B. C. Byrne

Primary Teacher, Public School No. 9, The Bronx

WHEN I came away from the American Museum of Natural History, Tuesday, I carried with me a sense of that institution's efficient service to the children of our greater city; and with an army of other teachers, I am grateful for the inspiring message which the Museum daily speaks to New York City's children through us their primary teachers. The work is of very tangible assistance to teacher, pupil and home.

Looking over the suggestive topics in the *Course of Study for the Elementary Schools of the City of New York*, the teacher of fifth year nature comes upon such large-looming headings as "Adaptation to Environment" and "Elementary Classification" and she asks herself, "How can I teach 'adaptation to environment' when there is nothing at hand, save a stray fly or English sparrow?" "How shall I teach 'elementary classification' when there is no illustrative material, save such forms of life as are found on the city's asphalt pavements or within the brick walls of the nearby apartment houses or factories?"

In answer to this problem comes the temptation to fall back on the time-honored textbook methods, but conscious of the delusion of isolated fact-learning, she answers her first question by asking a second: "What gain shall come to Dominick Guantomasi, or to Moses Rozansky, or to Patrick Sweeney, even though they do master such terms with definitions as 'amphibians, mollusks, crustaceans,' and all the rest?" It is in this definite and puzzling situation that the Museum comes forward with help.

Although pictures, lantern-slides, and concretely worded descriptions serve their purpose, nevertheless in all true nature teaching, the child should be brought into actual contact with the objects studied. This is simply because the power gained through this actual observation enables the pupil afterward to represent to himself these objects and others presented by oral description and home-reading. And so I would say that the Museum's classroom collections give content to the stories, fables, songs and other literature that the schools put into the hands of the City's children.

The Museum fills however a vastly wider field of usefulness in exhibiting within the Museum walls life forms in their natural environments. For every nature teacher knows emphasis should be placed at all times on plants and animals as living things and the true primary nature teacher is always conscious of her larger aim, to put herself and her pupils in loving touch with Nature. No easy task this, when the path of both teacher and child runs over the barren floor of the city-desert. Nevertheless, hidden by piled up apartment houses, office buildings and factories lie the City park and the City museum, each an educational oasis.

No one can doubt the inspiration and breadth of concept that comes when the teacher and class make an occasional visit to the Museum. Whether it be protective resemblance as shown by a weasel in winter or the clever adaptation of the mud nests of the flamingo, just one glance at these static reproductions of the actual objects in their natural environments makes more impression on the child mind than would volumes of verbal description.

These trips furnish also many indirect ethical and social opportunities. As teacher and class walk the Museum halls together, both are storming the guide with a fusillade of questions, and in the light of their common interest, the children see that their teacher is not a pedant but a student like themselves — a big comrade. Then, too, the city is gaining in good citizenship as the sixty heavily shod feet go clattering over the immaculate floors, because sixty busy little heads are thinking of how important they will be at supper-table, when, after father's home-coming, they will tell of wonderful things. Many of these descriptions will result in the child returning to the Museum with his foreign-born parents, and in this way, both parents and child will see for themselves one of the wise ways in which New York City spends her taxes.

A note of constructive criticism was heard from a school-man recently to the effect that if American children are lacking in courtesy as is said, the first step in getting rid of the undesirable trait is to give them something to reverence. The American Museum of Natural History is doing this. It is an institution that children reverence.

As we went through the Museum's halls Tuesday, the wolfish eyes of my dear little Rozansky grew snappingly bright, then the lines about the tight little lips softened, his whole face lit up with the humble reverence which one sees in the faces of old priests, the rough fingers clutched my arm, and he half exclaimed, half whispered, "If we only were to know everything in here, Miss Byrne!"

#### MUSEUM NEWS NOTES

At the meeting of the Executive Committee, October 18, the following persons were elected Life Members in consideration of gifts or services rendered to the Museum:

MR. CARL HAGENBECK of Stellingen-bei-Hamburg, in recognition of his gift to the Department of Vertebrate Palæontology of valuable models of extinct animals of South America;

MR. ALBERT OPERTI, for his gift of twenty-two oil paintings of the Peary meteorites;

MR. CLARENCE B. RIKER, for generous support of the Museum's ornithological work in South America;

DR. J. H. STEBBINS, in consideration of his gift of a collection of *Lepidoptera*;

DR. CARLOS DE LA TORRE, for assistance with palæontological work of the Museum in Cuba.

THE Museum has received through the New York Entomological Society a collection of insects from the heirs of the late Rev. J. L. Zabriskie. This collection contains more than twenty-nine thousand specimens accurately identified and carefully arranged and is a valuable addition to the entomological series.

A RECEPTION to the National Academy of Sciences will be given by the President and Trustees of the Museum on Wednesday, November 22.

THE Trustees have furnished a room which is reserved for the free use of Members of the Museum and their guests. This room is now open, located on the third floor near the elevators. For the convenience of Members the Trustees have equipped it with comfortable lounging chairs, and reading and correspondence tables. The Museum Journal, the Guide Leaflets and other current Museum publications are on file, and the Museum's collection of the portraits of its founders and benefactors will also be found here. Members, especially when accompanied by their children, are invited to go first to the Members' Room, where a matron will be found on duty, and where wraps and packages may be left while visiting the exhibition halls. A branch telephone connects with all parts of the building; by calling the Information Bureau the Members may summon the instructor, who will conduct them through the Museum.



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EXPLORATION NUMBER

THE  
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JOURNAL



EXPLORING PARTY IN VIEW OF MOUNT RORAIMA.

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December, 1911

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# The American Museum Journal

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MARY CYNTHIA DICKERSON, *Editor*

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Act of Congress, July 16, 1894



KAIETEUR, THE GREAT FALLS OF THE GUIANAS

No photograph or verbal description can set forth the magnificence of Kaieteur Falls and the wonderful beauty of their setting. Nearly four hundred feet wide and seven hundred and forty feet high — more than four times as high as Niagara — the white waters roll down from the hard rock on the brim to rush in a cataract through the great gorge

— "Through British Guiana and Brazil to Mount Roraima," page 283

# The American Museum Journal

VOL. XI

DECEMBER, 1911

No. 8

## A REVIEW OF THE MUSEUM'S EXPLORATION WORK

EXPLORATION has been a steadily growing factor in the development of the American Museum since 1887. It was in this year that Daniel Giraud Elliot accompanied by the taxidermist Jenness Richardson was sent into Montana to secure wild specimens of bison. The splendid Buffalo Group in the American Mammal Hall is the result of this expedition. In 1888 the newly appointed Assistant Curator of Birds, Frank M. Chapman, went to Florida on the first of his almost annual journeys. With the advent of Henry Fairfield Osborn, Curator of Vertebrate Palæontology in 1891 and of Frederic W. Putnam, Curator of Anthropology in 1894, explorations began in every department and have become an important branch of the Museum's work, until in the year 1911 there are no fewer than fifty localities being worked by parties in the field. In the twenty years from 1891 to 1911, the number of distinct exploring parties led by from one to four or five men, with a geographic range of work extending over North and South America, the South Pacific Islands, the West Indies and the East Indies, Eastern Asia and Northern and Central Africa, have been numerically distributed as follows:

Extinct and living races of men	163
Extinct mammals, reptiles, amphibians and fishes	65
Existing mammals, birds, reptiles and fishes	48
Geology of North America	10

In the early years of its history the Museum depended solely upon purchases from dealers and collectors; in recent years, except in the matter of minerals, its collections have been enriched far more by exploration than by purchase. Richer even than the collections is the scientific spirit which exploration has brought into the life of the Museum, the energy, devotion and self-sacrifice, the many contributions to the sum of human knowledge in geography, geology, ethnology, palæontology, and all branches of zoölogy. These place the Museum among the foremost scientific institutions in the country.

The exploration spirit has fostered the modern development of showing the environment with the specimen, of exhibiting a living picture of a mammal or a bird, just as it was William T. Hornaday's travels in the jungles of Borneo which led him to install in the National Museum of Washington in 1883 the first habitat group, showing orang-utans in their native forest. Now not only the naturalist but also the taxidermist, the photographer and the artist make up the well-equipped zoölogical expedition, and each contributes his quota to the *mise en scène* of a finished group.

## EXPLORING AND FIELD PARTIES OF 1911

The following fifty-one localities represent points at which exploration or field study and collecting have been in progress during the past year. Of this number forty-four stand for the work of definite exploring or collecting parties sent out by the Museum and acting under the direction of members of the Scientific Staff, while the remaining seven places represent the work of collectors, who are agents of the Museum in that they are authorized to gather together collections for purchase by the institution. All exploration work of the Museum must be carried on with Museum funds and is not in any way supported by the City.

### VERTEBRATE PALEONTOLOGY

1. Red Deer River, Alberta. Cretaceous and Lower Eocene Deposits. Barnum Brown.
2. Wyoming Eocene deposits. Walter Granger.
3. Miocene deposits near head of Niobrara River. Albert Thomson.
4. Pleistocene fossils at various points in Texas. Barnum Brown.
5. 6 and 7. Eocene fossils in Louisiana, Mississippi and Alabama. Barnum Brown.
- 8 and 9. Districts in Florida examined for fossil mammals by Barnum Brown.
- 10, 11, 14, and 15. Pleistocene fossils at points in Mexico. Barnum Brown.
- 12 and 13. Cuba near Caribarien in the north and Cienfuegos in the south. Barnum Brown.

### MAMMALOGY AND ORNITHOLOGY

1. Arctic Expedition in the field since 1908. Zoölogical Survey. R. M. Anderson.
2. Lower California Albatross Expedition for fishery, oceanographic and biological investigations. Charles H. Townsend.
- 3 and 4. Western Venezuela and northeastern Colombia. M. A. Carriker, Jr., agent.
5. Panama. W. B. Richardson, Collector.
6. Cauca region, western Colombia. Biological survey. Frank M. Chapman.
7. Turkestan. Local collector, agent of the Museum.
8. Japan and Korea. Study and Collection of whales. Roy C. Andrews.
9. Weihsien, Shantung, northern China. Paul D. Bergen, agent of the Museum.
10. British East Africa. Special study for habitat group of elephants. Carl E. Akeley.
11. Congo Region. In the field since 1909. Zoölogical survey with reference first to mammals and birds and second to ethnological study, to invertebrates, fishes and reptiles. Herbert Lang and James Chapin.

### INVERTEBRATE ZOÖLOGY

1. Nahant, Mass. Tide-pool fauna. R. W. Miner.
2. Black Mountains, N. C. Insects. Hoffman Expedition, William Beutenmüller.
3. Florida. Exploration and collecting. F. E. Lutz and C. W. Leng.
4. Jamaica. Insects: problems of distribution. J. A. Grossbeck.
5. Dominica. Problems of evolution. H. E. Crampton, R. W. Miner and F. E. Lutz.
6. Biological survey, British Guiana. H. E. Crampton and F. E. Lutz; Brazil to Mt. Roraima, H. E. Crampton.

### ANTHROPOLOGY

1. Arctic Expedition. Eskimos, especially of unexplored Coppermine Region. V. Stefánsson.
2. Sitka and Alaskan Coast. Tlingit Indians. W. S. Taylor and Lieut. G. T. Emmons.
3. Saskatchewan, Chipewyan Reservation. Phonetic and ethnological. P. E. Goddard.
4. Alberta, Sarsi Reservation. Linguistic and ethnological study. P. E. Goddard.
5. North Dakota, Ft. Berthold Reservation. Material culture. G. L. Wilson, agent.
6. Montana, Crow Reservation. Societies and ritualistic ceremonies. R. H. Lowie.
7. South Dakota, Pine Ridge Reservation. Clark Wissler and J. R. Walker, agent.
8. Wisconsin, Menomini Reservation. Societies, medicine bundles. Alanson Skinner.
9. Paterson, N. J. Rock shelters of prehistoric man. Max Schrabisch, Museum agent.
10. Oklahoma, Kiowa Apache Reservation. Linguistic study. P. E. Goddard.
11. Santa Fé, N. M. Material culture and art, Rio Grande Pueblo Indians. H. J. Spinden.
12. Tucson, Ariz. Textile arts of Papago and Pima Indians. M. L. Kissell.
13. Mexico City. Reconnaissance in archæology. H. J. Spinden.

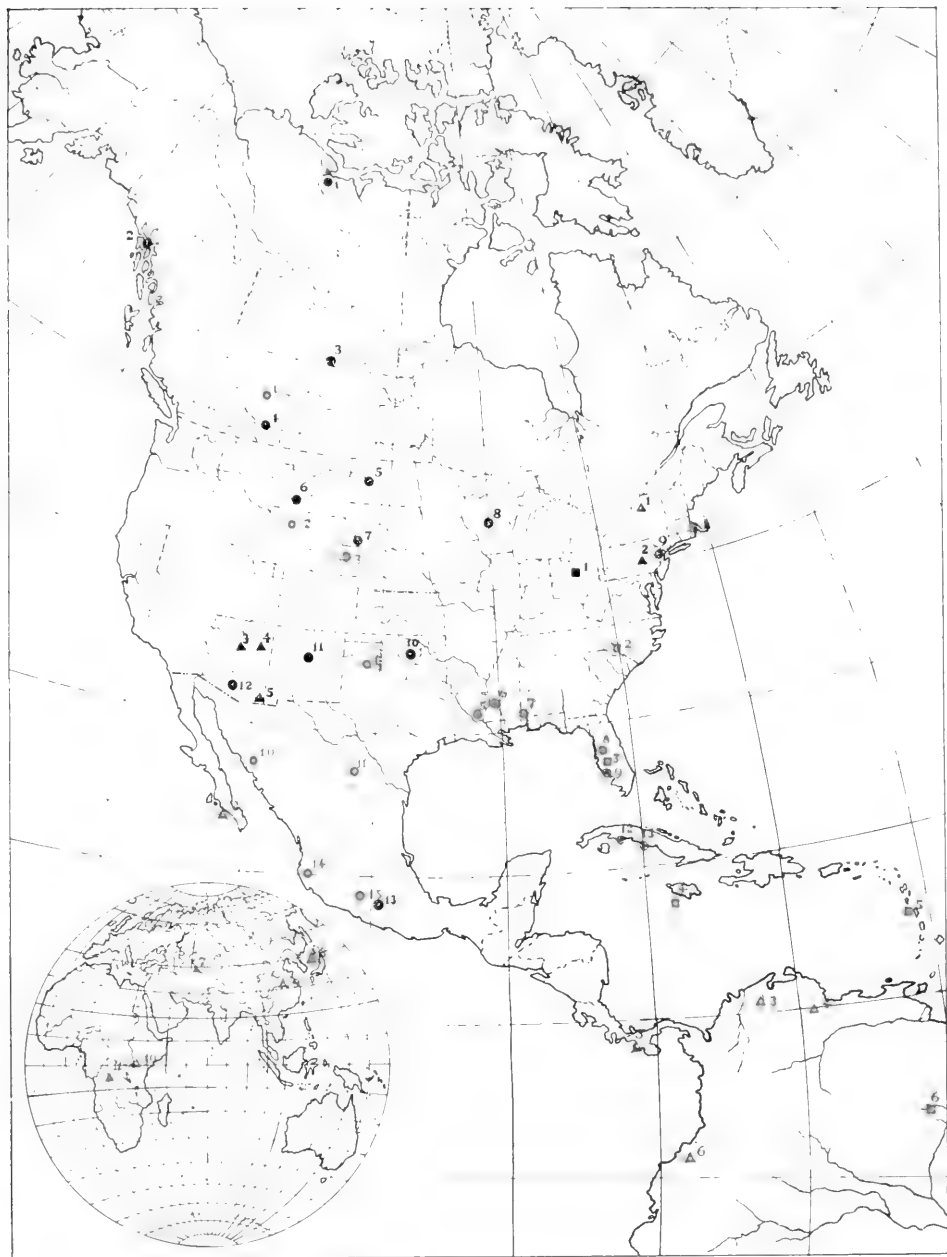
### GEOLOGY AND INVERTEBRATE PALEONTOLOGY

1. Russell, N. Y. Field work for glacial pot hole.
2. Lancaster, Penn. Field collection of Cambrian trilobites.
- 3 and 4. Arizona. Field study of meteor crater and petrified forests. E. O. Hovey.
5. Bisbee, Ariz. Queen Copper mine for mine model and cave. E. O. Hovey.

### ICHTHYOLOGY AND HERPETOLOGY

1. Districts in Ohio. Collections of Devonian fossil fishes. L. Hussakof.





### Location of Exploring and Field Parties of 1911

- |                             |  |
|-----------------------------|--|
| ● Vertebrate Palaeontology  | ● Anthropology                           |
| ▲ Mammalogy and Ornithology | ▲ Geology and Invertebrate Palaeontology |
| ■ Invertebrate Zoology      | ■ Ichthyology and Herpetology            |

If from these localities lines were drawn to New York, they would present graphically the influx of new material and ideas for the Museum's research and exhibition. In many cases the marks indicate but a small fraction of the area actually explored



Three members of the Department of Invertebrate Zoölogy fording a stream in Dominica

### FAST VANISHING RECORDS

*By Frederic A. Lucas*

THE many expeditions sent out under the auspices of the Museum represent a most important branch of its work; they not only seek the records of the past, but also endeavor to secure for posterity the records of the present, which are in even greater danger of being lost.

Not only is man changing the entire face of nature, mowing down its forests and sweeping out of existence their inhabitants, but he is also blotting out with the sponge of civilization the everyday customs of the most secluded and isolated races of mankind. It is not so long ago that Sir John Franklin and his crew disappeared amid the Arctic ice and all traces of his ill-fated expedition were sought in vain for years; it is only yesterday that Livingstone was "lost" in Central Africa and Stanley dispatched to seek him. To-day an enterprising firm puts up a special brand of baking powder for the western Eskimo; Stefánsson deems it worthy of note that after three years' search he has found natives who have never seen a white man; and excursion trains are run to the falls of the Zambesi.

The public looks upon the mastodon as a rare animal, but more than a dozen skeletons are preserved in our museums and others are continually coming to light, while there is not in all the United States the skeleton of an adult wild African elephant. And Mr. Carl E. Akeley tells us that in a very few years not a single really old elephant will be left in the length and breadth of Africa, so keen is the hunt for ivory. Mr. A. Radclyffe Dugmore shows a photograph of a herd of hippos and tells us that since the picture was taken the herd has been exterminated.

A short time ago we read with pained interest articles on animals that have recently become extinct — soon it will be simpler to write of the animals that are left. Of course much of the extermination is, from man's standpoint, unavoidable. Man and wild beasts cannot live together in harmony, be he never so willing. We are all familiar with Kipling's graphic picture of "Letting in the Jungle," and in Africa, Mr. Akeley says that this is no fancy sketch, for a few elephants in a single night will undo the patient labor of years, trampling down crops and uprooting trees over many acres of cultivated land.

There are in existence boats in which hardy Norsemen may have cruised along the coast of New England before Columbus was born; we have queer craft that floated on the Nile in the time of Pharaoh, and canoes in which the early Britons paddled down the Thames when the hyena howled on the bank and the cave bear crashed through the underbrush. We possess not a fragment of the strange Beothuk canoes seen by Cabot and Cartier and scarcely more than a splinter even of one of the canoes that hovered about the "Half Moon" on her voyage up the Hudson little more than three hundred years ago. We know far more about the beliefs, the customs, the dress of the early Egyptians than we do of those of the Indians of Manhattan and Massachusetts.

The savage takes little interest in posterity, his immediate concern is with the present — to solve as easily as possible the problems of daily life. The ever present tin can costs no labor save that of picking it up, so it supersedes the basket; birch trees have become scarce and the picturesque birch bark canoe gives way to one covered with cotton cloth. So it is the world over:

"The old order changeth  
Yielding place to new"—

and if within a very few years we do not secure the vanishing wild animals and not merely the fast disappearing utensils but also a record of the habits and beliefs of wild — or once wild — races, they will be lost to us and to the world forever.



A part of the Museum's Arctic Expedition pursuing its way over the snow and ice of the Coppermine River



THE BIG SLIDE TWENTY MILES BELOW RED DEER

A point on the Red Deer River where skulls and mammal jaws were collected from Eocene deposits. The river follows majestic curves and where its banks have no skeleton of rocks to hold them firm, it cuts into the high walls of clay, which plunge down from time to time nearly choking the channel



Flatboat constructed for drifting down Red Deer River. A twenty-two-foot sweep at each end, like a long oar, served in guiding the boat out of the way of rocks in the course. This was eventually converted into a houseboat because of excessive rains and dearth of camping places along the shores

## FOSSIL HUNTING BY BOAT IN CANADA

*By Barnum Brown*

Photographs by the Author

“**H**OW do you know where to look for fossils?” is a common question. In general it may be answered that the surface of North America has been pretty well explored by government surveys and scientific expeditions and the geologic age of the larger areas determined. Most important in determining the geologic sequence of the earth's strata are the fossil remains of animal and plant life. A grouping of distinct species of fossils correlated with stratigraphic characters in the rocks determines these subdivisions. When a collection of fossils is desired to represent a certain period, exploring parties are sent to these known areas. Sometimes however, chance information leads up to most important discoveries, such as resulted from the work of the past two seasons in Alberta, Canada.

A visitor to the Museum, Mr. J. L. Wagner, while examining our mineral collections saw the large bones in the Reptile Hall and remarked to the Curator of Mineralogy that he had seen many similar bones near his ranch in the Red Deer Cañon of Alberta. After talking some time an invitation was extended to the writer to visit his home and prospect the cañon. Accordingly in the fall of 1909 a preliminary trip was made to the locality.

From Didsbury, a little town north of Calgary, the writer drove eastward ninety miles to the Red Deer River through a portion of the newly opened grain belt of Alberta, destined in the near future to produce a large part

of the world's bread. Near the railroad the land is mostly under cultivation and comfortable homes and bountiful grain fields testify to the rich nature of the soil. A few miles eastward the brushland gives way to a level expanse of grass-covered prairie dotted here and there by large and small lakes probably of glacial origin. Mile after mile the road follows section lines and one is rarely out of sight of the house of some "homesteader." It is through this level farm land that the Red Deer River wends its way flowing through a cañon far below the surface. Near Wagner's ranch the cañon was prospected and so many bones found that it appeared most desirable to do extended searching along the river.

Usually fossils are found in "bad lands," where extensive areas are denuded of grass and the surface eroded into hills and ravines. A camp is located near some spring or stream and collectors ride or walk over miles of these exposures in each direction till the region is thoroughly explored. Quite different are conditions on the Red Deer River. Cutting through the prairie land the river has formed a cañon two to five hundred feet deep and rarely more than a mile wide at the top. In places the walls are nearly perpendicular and the river winds in its narrow valley, touching one side then crossing to the other so that it is impossible to follow up or down its course any great distance even on horseback.

It was evident that the most feasible way to work these banks was from a boat; consequently in the summer of 1910 our party proceeded to the town of Red Deer, where the Calgary-Edmonton railroad crosses the river. There a flatboat, twelve by thirty feet in dimension, was constructed on lines similar to a western ferry boat, having a carrying capacity of eight tons with a twenty-two foot oar at each end to direct its course. The rapid current averaging about four miles per hour precluded any thought of going up stream in a large boat, so it was constructed on lines sufficiently generous to form a living boat as well as to carry the season's collection of fossils.

Supplied with a season's provisions, lumber for boxes, and plaster for encasing bones, we began our fossil cruise down a cañon which once echoed songs of the *Bois brûlé*, for this was at one time the fur territory of the great Hudson Bay Company.

No more interesting or instructive journey has ever been taken by the writer. High up on the plateau, buildings and haystacks proclaim a well-settled country, but habitations are rarely seen from the river and for miles we floated through picturesque solitude unbroken save by the roar of the rapids.

Especially characteristic of this cañon are the slides where the current setting against the bank has undermined it until a mountain of earth slips into the river, in some cases almost choking its course. A continual sorting



We traveled for two hundred and fifty miles through such cañons. Judging from the wildness of the view, we were thousands of miles away from any habitation of man, yet now and then could gain a glimpse of haystacks on the level plateaus above. The expedition's camp and boat are seen on the bank in the foreground.



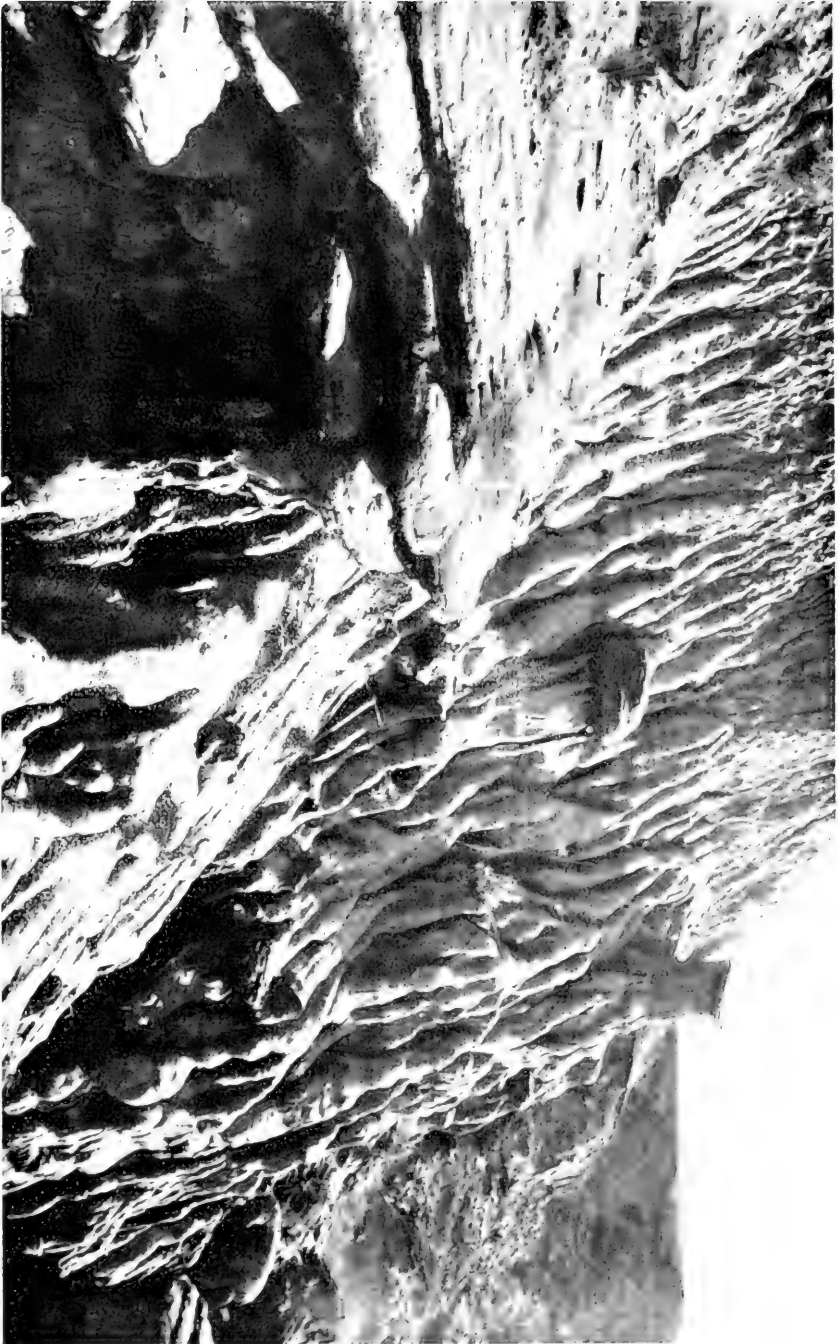
View on top of the plateaus along the Red Deer River. This Mecca of the farmer shows bountiful grain fields where once flourished nothing but brush. This given out field produced eighty bushels to the acre.



CLAY BUTTES ALONG THE RIVER

Such regions we searched carefully, climbing up the clay buttes to trace each channel of rivulets in the hope of discovering some skeleton partly brought to view by the action of the water





A FOSSIL IN POSITION (JUST ABOVE THE PICK)

At this spot three hundred feet above the river, an *Achiloscaurus* skeleton was found. The skull lies at the head of the pick, the tail and other parts of the skeleton had washed out and down and were partly covered twenty feet below. To obtain the skeleton the side of the hill was blasted off through an area thirty feet long and twenty-five feet high.

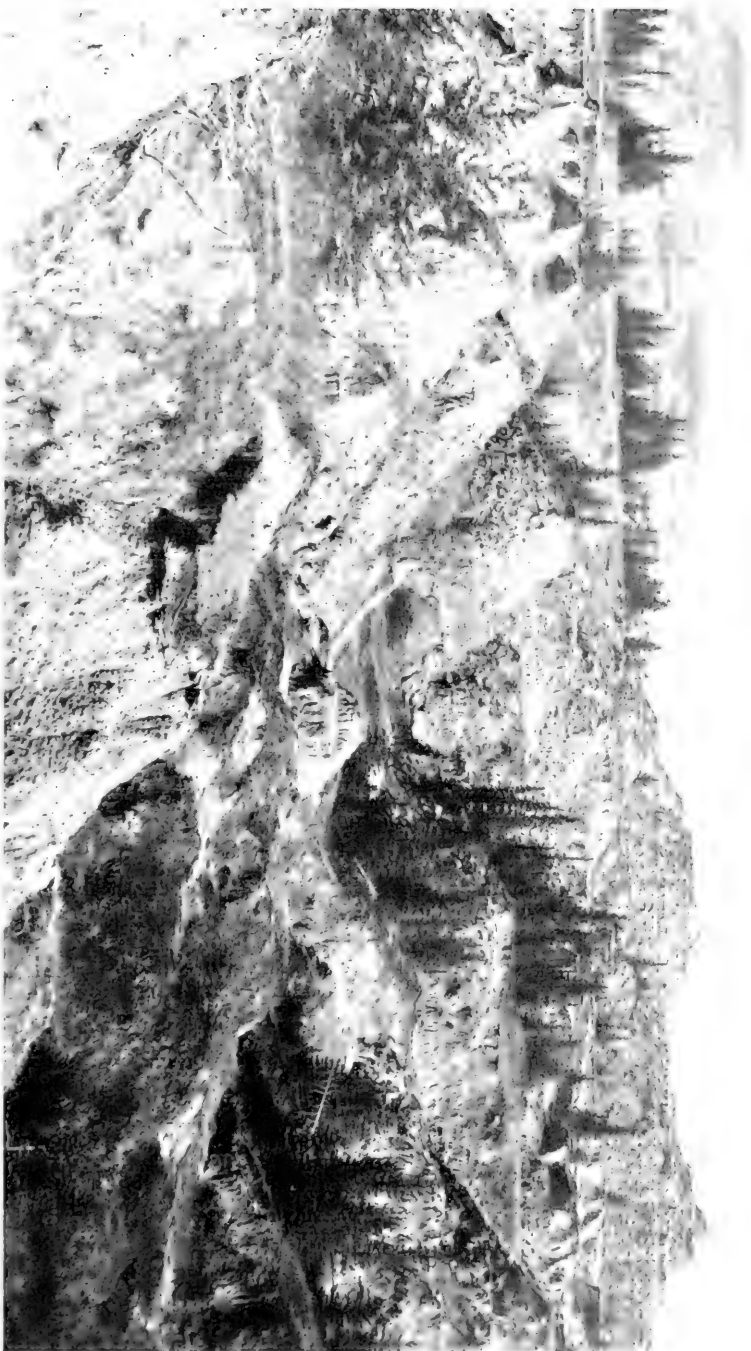
thus goes on, the finer material being carried away while the boulders are left as barriers forming slow moving reaches of calm water and stretches of rapids difficult to navigate during low water. In one of these slides we found several small mammal jaws and teeth not known before from Canada, associated with fossil clam shells of Eocene age.

The long midsummer days in latitude  $52^{\circ}$  gave many working hours, but with frequent stops to prospect the banks we rarely floated more than twenty miles per day. An occasional flock of ducks and geese were disturbed as our boat approached and bank beaver houses were frequently passed, but few of the animals were seen during the daytime. Tying the boat to a tree at night we would go ashore to camp among the trees where after dinner pipes were smoked in the glow of a great camp fire. Only a fossil hunter or a desert traveler can fully appreciate the luxury of abundant wood and running water. In the stillness of the night the underworld was alive and many little feet rustled the leaves where daylight disclosed no sound. Then the beaver and muskrat swam up to investigate this new intruder, while from the tree-tops came the constant query, "Who! Who!"

For seventy miles the country is thickly wooded with pine and poplar, the stately spruce trees silhouetted against the sky adding a charm to the ever changing scene. Nature has also been kind to the treeless regions beyond, for underneath the fertile prairie, veins of good lignite coal of varying thickness are successively cut by the river. In many places these are worked in the river banks during winter. One vein of excellent quality is eighteen feet thick, although usually they are much thinner. The government right has been taken to mine most of this coal outcropping along the river.

Along the upper portion of the stream are banks of Eocene age, from which shells and mammal jaws were secured, but near the town of Content where the river bends southward, a new series of rocks appeared and in these our search was rewarded by finding dinosaur bones similar to those seen at Wagner's ranch. Specimens were found in increasing numbers as we continued our journey, and progress down the river was necessarily much slower. Frequently the boat would be tied up a week or more at one camp while we searched the banks, examining the cliffs layer by layer that no fossil might escape observation. With the little dingey the opposite side of the river was reached so that both sides were covered at the same time from one camp. As soon as a mile or more had been prospected or a new specimen secured, the boat was dropped down to a new convenient anchorage. Box after box was added to the collection till scarcely a cubit's space remained unoccupied on board our fossil ark.

Where prairie bad lands are eroded in innumerable buttes and ravines

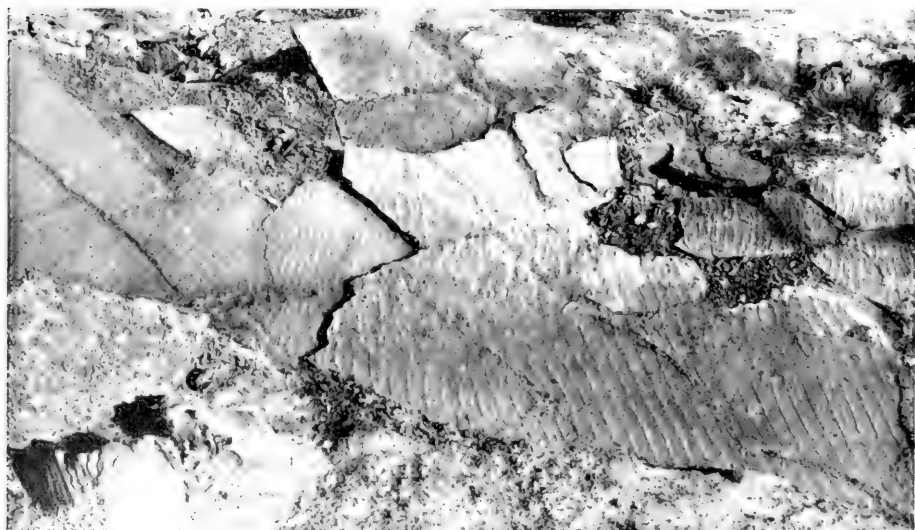


ONE OF THE MOST PICTURE-SQUE SECTIONS ALONG RED DEER RIVER

Black-tailed deer were frequently seen in such regions. This is the site of the crossing of the Alberta Central Railroad bridge, which is to be one mile in length and four hundred and seventy feet above the water.



A view across the cañon from the left bank of the river. Taken from an elevation of five hundred feet



Fossil ripples in sandstone. In the Cretaceous period of the past these were ripples in sand along the shores of some prehistoric lagoon, where grew figs and other warm temperate vegetation contrasting with the present vegetation and the ice and snow of Alberta



At this point some distance up from the river, an eight-hundred-pound specimen was excavated. A sled was constructed on which to drag it down to the river.



At the river the specimen was floated in a little dingy down to the big boat.



it is always doubtful if one has seen all exposures, so there was peculiar satisfaction in making a thorough search of these river banks knowing that few if any fossils had escaped observation. On account of the heavy rainfall and frequent sliding of banks new fossils are exposed every season so that in a few years these same banks can again be explored profitably. This river will become as classic hunting ground for reptile remains as the Bad Lands of South Dakota are for mammals.

Although the summer days are long in this latitude the season is short and thousands of geese flying southward foretell the early winter. Where the temperature is not infrequently forty to sixty degrees below zero in winter, it is difficult to think of a time when a warm climate could have prevailed, yet such condition is indicated by the fossil plants.

When the weather became too cold to work with plaster, the fossils were shipped from a branch railroad forty-five miles distant, the camp material was stored for the winter and with block and tackle the big boat was hauled up on shore above the reach of high water.

In the summer of 1911 the boat was recalced and again launched when we continued our search from the point at which work closed the previous year. During the summer we were visited by the Museum's President, Prof. Henry Fairfield Osborn, and one of the Trustees, Mr. Madison Grant. A canoeing trip, one of great interest and pleasure, was taken with our visitors covering two hundred and fifty miles down the river from the town of Red Deer, during which valuable material was added to the collection and important geological data secured.

As a result of the Canadian work the Museum is enriched by a magnificent collection of Cretaceous fossils some of which are new to science.



The gorge of the Potaro River below Kaieteur Falls

## BRITISH GUIANA AND BRAZIL TO MOUNT RORAIMA

*By Henry E. Crampton*

Photographs by the Author

**D**URING the past summer I had the good fortune to make a journey from Georgetown on the coast of British Guiana to the great mountain of Roraima — the famous tableland that stands at the junction of Brazil, Venezuela and British Guiana. In its course the way led along the rivers of the lower country to Kaieteur, the magnificent waterfall of the Potaro River, then continued through the higher forests of Guiana across the border and out on the savannahs of northern Brazil.

The main object was to run a biological traverse from the coast to the high levels centering about Mount Roraima. To the biologist, the fauna and flora of this portion of South America are particularly interesting in connection with the larger problems of geographical distribution and evolution, for reasons which may be briefly stated as follows. During the glacial period, great ice sheets came well down into the United States and destroyed many or most of the species living there. Later the climatic conditions changed to those of the present temperate situation; as such changes gradually came about, North America was repopulated by organisms which set out from South America, and mainly from two centers of dispersal. The first of these was the northern Andean region, from which most of the emigrants reached the United States by way of the Isthmus of





ON THE POTARO RIVER NEAR KAITETUR

Leaving Kaitetur camp for the further journey toward Mount Rorima. The two smallest boys remained to assist Dr. Lutz; the others proved splendidly efficient carriers throughout the expedition's travels



Panama, Central America and Mexico. The other center was the high interior region of which Roraima is the present focus, from which migration was mainly by way of the West Indies and Florida.

With these fundamental facts at hand, the Department of Invertebrate Zoölogy of the American Museum reached a point in the development of its scientific work where it seemed desirable to undertake an extensive series of explorations in the Antilles and northern South America, in correlation with field studies in characteristic localities of North America, in order to trace as clearly as possible the lines of migration and distribution in past geological times, and to gain fuller knowledge of the evolutionary history of lower organic forms. In pursuance of these purposes, an attack upon the Roraima center of dispersal was determined upon for an initial survey.

After a short period of field work in Dominica and other islands, Dr. Lutz and I continued on to Demerara, and on July first we sighted the low coast of the continent where the many chimneys from the sugar mills rose like so many lighthouses. With the aid of new-found friends in the colony, final preparations were hastened for the start into the interior, which was made by steamer up the Demerara River. The scenery along the river prevented the time from passing tediously, soon our equipment was transferred to the awaiting train, and we went on to the Essequibo River. Owing to the heavy rains of the preceding weeks this river was well up under the hostelry where we stopped, so that the house servants angled from the very windows with almost ludicrous success. The howling of the monkeys, new to our ears, roused us early on the following morning, and for a day we remained here, occupying the time profitably in collecting on the sandy lowlands and rises back from the river, where the drogher ants ply their ceaseless course from the leafy boughs to underground chambers. On July 10, we proceeded to Tumatumari and here, as well as farther on up the rivers, we found ourselves the first occupants of the rest-houses built for the use of travelers to Kaieteur. The journey to Potaro Landing, and the walk across country to Kangaruma were accomplished without incident. At the latter place, three Patamona Aekawoi Indians were secured and, the journey resumed, we arrived at Tukeit on the evening of July 15, one week from Georgetown. It was almost a physical relief to reach the foothills of the higher ground after the continuous lowlands. Doubly enjoyable was the first glimpse of Kaieteur, which we saw from a point far down the gorge, above waters so still that not only were the mountains reflected in all their beauty of form and color, but even Kaieteur itself was mirrored there.

The next task was to accomplish the transport of our goods to the Kaieteur Plateau from Tukeit, the head of river navigation. Two of our



Indian file across the savannas



Looking over the dense canopy of the forest toward the cloud-filled valley of the Ireng River and to the Brazilian border beyond

own Indians were sent for bearers to the settlement on the Chenapowu about "Holmia," the home of the late Dr. Bovallius, thirty miles beyond the rim of the great falls. On July 19, Sprostons' men carried up enough equipment to establish a camp and field-base on the Potaro River, about a mile above the falls, where I took up my work.

No photograph or verbal description can set forth the magnificence of Kaieteur Falls and the wonderful beauty of their setting. Nearly four hundred feet wide and seven hundred and forty feet high, the white waters roll down from the hard rock on the brim to rush in a cataract through the great gorge, nearly a thousand feet below the level of the plateau. It was a delight to explore the forests and savannahs of this plateau, and to gain with every day new views of the beauty of this natural marvel.

Our Indian messengers returned on the twenty-first with a party of eleven Chenapowu natives and better still, with a "ballyhoo" (or punt) which was very old but none the less serviceable. Shy and reticent at first, the Indians soon responded to advances and by the twenty-eighth, when all the goods were brought up, cordial relations had been established. Dr. Lutz, who had remained below to study the Tukeit region in detail, came up with the last carriers to occupy the camp and to make a close comparative study of the savannahs and forests of the Kaieteur Plateau, while I pushed on to Brazil in the hope of reaching Roraima. It is true the attempt seemed foolhardy in view of the short time available and the arduous nature of the journey beyond, but it was thought that at least the Brazilian savannahs could be gained and studied, while chance might favor the successful accomplishment of the whole journey. Accord-



Toiling up a sharp ascent on the rolling Brazilian savannahs

ingly on July 28, farewells were said, the "ballyhoo," the "corials" (canoes), and the woodskins were loaded and off we went up the river; late in the afternoon of July 30, we arrived at Chenapowu. The river traveling was over for the time, and now imagination ran ahead along the distant way through the forests and across the savannahs to Roraima, a distance of one hundred and ten miles that had to be traversed entirely on foot. One day's halt was necessary for the organization of the provision loads and for the engagement of additional bearers; and then on August first, the line of twenty-six natives filed off into the forest.

We reached Saveritik on the Ireng River, which forms the Brazilian boundary, at about noon of August 5, with the first third of the long walk successfully accomplished. Taking account of the remaining provisions and of the available time, it was obvious that a crisis had been reached. Slow traveling and vexatious delays had so reduced supplies that they were insufficient for the journey to Roraima and back to Saveritik. Two courses were open: we could go on within the margin of safety, penetrate for some distance into Brazil, and study the life of the savannahs at their northern limit, or we could still make the effort to reach Roraima in the hope and expectation of obtaining food somewhere beyond. The lure of the famous mountain made the decision, and accordingly the number of bearers was reduced to seventeen, while four men were sent back to Kaieteur for additional supplies to be at hand on our return to that point. On August 6 we safely passed the river, and it was not without some emotion that I stepped out into the forests of Brazil, a country that will always hold the interest of scientists on account of the work of such men as Bates, Wallace, Agassiz, and Darwin.

After a steep climb through the forests up to a barometric level of 3600 feet, we emerged on to the great savannahs. Before us rolled great grassy plains marked here and there by the deeper greens of the forest trees along the watercourses. Occasionally an outcrop of reddened soil or gray clay added its contrasting color. From this time on, we lived amid such scenes, camping for the noonday meal in a patch of forest by a wayside stream, or sometimes on the open savannah, unprotected from the fierce direct rays of the sun at its zenith. Gathering specimens by the way we would at length come to a favorable site for the night camp where the bundles of equipment would be set down, the natives would receive their rations, and the smoke from the camp fires would rid us of the sandflies which were always present in immense numbers.

After several days of such traveling we came out upon the great headland overlooking the beautiful valley of the Kwating River whose wide plain spread 1500 feet below, and at last we could see flat-topped and cloud-



A SUCCESSFUL KILL BY THE GUIANA CARIB INDIANS OF THE EXPEDITION  
On the savannas of Brazil during the return journey when rations were short



The valley of the Arabopo River, an affluent of the Orinoco near its source in the high savannahs near Roraima



The southern end of Mount Roraima 8600 feet high, viewed from a headland 4500 feet high four miles distant



The southwest face of Roraima, three miles across. The cliffs are two thousand feet high



A volunteer assistant during the noon-day halt at an Indian settlement



Bartering for food and Indian handiwork during a visit to Chief Jeremiah and his Aracuna tribe on the lower slopes of Roraima

veiled Roraima, still several days journey away. At a place called Parmak, formerly the site of a flourishing village of Indians, a guide was found who knew a shorter way to the goal, which led to the southward of the great terraced mountain of Weitipu instead of to the north as in the case of the route known to the geographers of Georgetown. So with renewed courage we disregarded the low condition of supplies and again pushed on toward Roraima.



Camp at Saveritik on the Guiana border where Aekawoi Indians continually crowded about to barter



Finally on August 13, we reached the lower slopes of the great mountain, and camped for the night in a small patch of woods about a mile short of an Arecuna Indian village called Kamaiva-wong. From this place the savannahs roll upward to a forest belt, from five thousand to six thousand feet in barometric level, and then the great cliffs rise two thousand feet to the jagged edge of the flattened mountain top. A narrow and shallow gorge intervenes between Roraima and Kukenaam, the latter scarcely less impressive than its more famous sister. Down the cliffs fall the narrow streams of water that reach the Atlantic Ocean by way of the rivers of Guiana, the Amazon, and the Orinoco — so close are the sources of these widely diverging streams.

The next morning, with four or five of my Aekawois, I walked the intervening mile or so to Kamaiva-wong, and was received by Chief Jeremiah and his tribe, with whom I bartered for bows and arrows, baskets and blow-guns, and the cassava bread which was so much more necessary and desired. In the afternoon, studies were made on the upper slopes toward the cliffs, the evening meal was eaten, and we turned in, not without misgivings regarding the return journey which was to begin on the morrow. The ascent could not be attempted for lack of time, while furthermore the top is already well known from the studies of Sir Everard im Thurn and of Quelch and McConnell.

The journey was interesting though arduous. Naturally, fuller results might have been secured had the time been longer, but on the whole the expedition was successful. The Indians were splendidly efficient carriers, while to Charles Raggoo, my capable Hindu, a large share of credit belongs, as his long experience in the bush provided a fund of knowledge upon which I drew largely in conducting the affairs of the expedition.

It is difficult to present the biological results of the expedition in a brief form for the material must be studied in great detail, yet some significant facts appear with clearness. The survey passed from the forests of the coast to those of Roraima itself, and everywhere, no matter what the altitude might be, certain species recurred again and again; other species seemed to be characteristic of savannahs of all levels. Still other organisms were restricted to levels of a given altitude; and finally each river system had its peculiar types. Combining this analysis with similar studies elsewhere, in time we will gain the sought-for knowledge of distribution and evolution.



THE CENTRAL ANDIS, WESTERN COLOMBIA. LOOKING EAST FROM THE CAUCA VALLEY

## THE ZOÖLOGICAL EXPEDITION TO WESTERN COLOMBIA

*By Frank M. Chapman*

NOW that the birds and mammals of North America are adequately represented in our museums, American zoölogists are turning their attention to South America. At the present time the fauna of South America is represented in European museums much more fully than it is in American museums. It is high time therefore that we should enter this field, and the beginning of the present year saw no less than six American expeditions engaged in zoölogical work in northern South America. Among these, two represented the American Museum — namely, one conducted by Mr. M. A. Carriker, Jr., who is collecting mammals for the Museum in Venezuela and the Santa Marta region in Colombia; and a second, under the direction of the writer, in the Cauca region of Colombia. This portion of Colombia is said to be one of the most mountainous regions in the world. Its great physiographic diversity and the widely varying climatic conditions to be found there make it doubtless one of the most interesting parts of South America for biological work.

While many thousands of birds and mammals have been collected in tropical America heretofore, a large proportion of them have been secured either by natives or by professional collectors, who were more interested in the acquisition and sale of specimens than in the record of observations which would make these specimens of value in the study of a distribution of life. In selecting this part of South America therefore as a field for investigation, the Museum had in mind not only the enrichment of its collections, but also the gathering of data on which to base a study of the distribution of life in this exceedingly interesting and comparatively little-known part of the world.

It will be observed that immediately north of the boundary of Ecuador, the Andes are divided into three well-marked ranges, Coast, Central and Eastern. The Coast Range, so far as our explorations have informed us, does not exceed an elevation of 10,500 feet. The average elevation of the Central Range is about 12,000 feet, with several peaks having an elevation of at least 18,000 feet. Snowline we have found to be reached at an elevation of 15,000 feet. The Eastern Range reaches approximately the elevation of the Coast Range and is without snow peaks. Between the Coast and the Central Ranges lies the Cauca Valley, some two hundred miles in length and thirty in width, and having an average elevation of 3500 feet; in this respect being unlike any other valley of similar extent in South America. So far as its climate goes, it is rather an elevated plateau than a valley. Between the Central and the Eastern Ranges lies the valley of the



Standpoint in the heavy forest on the summit of the Coast Range of the Andes chosen for reproduction in a Museum habitat group. The moss-covered tree trunks indicate the extreme humidity of the locality

Magdalena, which at the headwaters of navigation, some thousand miles from the sea, has an altitude of only a few hundred feet.

In addition to the climatic zones lying between sea level and snowline, the faunal conditions of this region are further diversified by rainfall. The western slope of the Coast Range differs widely from the conditions prevailing on most of the Pacific coast of South America, in being exceedingly humid. The annual rainfall at the port of Buenaventura is said to exceed four hundred inches.<sup>5</sup> The western slope of the Coast Range therefore, from sea level to the summit of the range is densely forested. The eastern slope of this range however, lacking the heavy precipitation which occurs on the western slope, is comparatively arid and consequently treeless. The Cauca Valley itself receives, for the tropics, only a limited amount of rain, sufficient however for agricultural purposes; while the foothills of the

western slope of the Central Range apparently do not receive a sufficient amount of rainfall to produce heavy forest growth. When one ascends the Central Range however, heavy forests are found at an elevation of about 6000 feet, and from this point to 12,500 feet forest growth prevails. Above 12,500 feet occur the paramos, those treeless marshes which may be compared to the tundras of the North.

Adding to these widely varying conditions the broad savannahs of the Cauca Valley, it is clear that we have here a region suited to the wants of a great variety of life and one offering an exceedingly promising field for the study of the influences which govern the distribution of life.

In November, 1910, Mr. W. B. Richardson was dispatched to the Cauca Valley, with headquarters at Cali and instructions to work the west slope of the Coast Range. In March, 1911, the writer accompanied by Mr. Louis Agassiz Fuertes as artist, and Mr. Leo E. Miller as preparateur, joined Mr. Richardson at Cali. Mr. Richardson having completed his work on the western slope of the Coast Range, we began our operations on the summit of the range near the San Antonio Pass, at an elevation of 6600 feet. Here large collections were made, as well as field studies for a habitat group, which has for its immediate foreground the forest on the summit of the Coast Range, whence one looks down the arid east slope of this range to the fertile Cauca Valley with the Central Range rising in the distance.

From this point the expedition journeyed to the hacienda La Manuelita in the Cauca Valley, three miles north of Palmira, where for a time we were the guests of Mr. Charles J. Eder. Later we ascended the Central Range to the eastward reaching an elevation of 6200 feet, where Mr. Eder placed at our disposal a bungalow which he has had erected there. At this point primeval forests were only three hundred feet above us, and we found ourselves very favorably situated for the purposes of collecting and observing. Expeditions were made farther into the mountains from this point as a base, and much interesting and novel information secured.

From Miraflores, as this locality is named, we traveled northward into the Cauca Valley in an effort to find a place at which first-growth forests still exist. In this attempt however, we were only partially successful since the region has been so long settled that the original forest has disappeared. Returning to Cali, our base, on May 15, Mr. Richardson with Mr. Miller and a native assistant, were sent to Popayán at the southern end of the valley with instructions to penetrate the Coast Range to the westward, while Mr. Fuertes and the writer went up the valley to Cartago at its northern end, and thence across the Central Andes over the Quindio Pass to the Magdalena River at Girardot; here we embarked for Barranquilla near the mouth of the river, and later sailed from Santa Marta for New

York. This reconnaissance was made to enable us more effectively and more intelligently to direct further work in this region.

On August 15th, Mr. Richardson and Mr. Miller returned to Cali after a most successful trip in the Coast Range. In the meantime Mr. Arthur A. Allen had been sent to Cali to replace Mr. Richardson, whose contract had expired. Mr. Miller and Mr. Allen started for Cartago August 23 en route to the Central Range to work certain localities which had been discovered on our homeward journey. Letters received from them dated September 29, tell of the success which has attended their efforts. Collections have been made at 10,500 feet, and also on the paramo of Santa Isabel at elevations ranging from 12,500 to 15,000 feet, or to the lower limit of snow. Having completed their section of the Central Range to the Magdalena Valley, they will return to Cartago from which point they will make a section in the Coast Range toward N6vita.

The results thus far accomplished are exceedingly interesting and valuable. Already the Museum has received some three thousand birds and five hundred mammals, an unusually large proportion of which are new to its collections, while others are obviously new to science.



Standpoint of the new bird group. Tree fern at the right



A Sun Dance among the Plains Cree Indians

## ANTHROPOLOGICAL FIELD WORK FOR THE YEAR

*By Clark Wissler*

THE field investigations of the anthropological staff have in the main been directed toward the solution of one general problem, the historical relations of cultures up and down the central portions of the United States and Canada. A few years ago this investigation began with simultaneous visits to the Cree Indians around Hudson Bay, the Crow



A Blackfoot woman praying to the setting sun. At one stage of the annual Sun Dance old women come forward with women and children for whom they call upon the Sun to exercise fatherly care during the year. The Sun Dance was first observed by Dr. E. P. Goddard on a Museum expedition in 1911, and in so far as it has never been reported for this tribe may be said to be a discovery.

and other tribes of the Plains, and the nomadic and more sedentary tribes of the Southwest.

Within this geographical belt there are survivors of many prehistoric groups, speaking some twenty languages and representing several somatic types. This year all our field staff has concentrated on two main points, the systems of social groupings (or societies) and ritualistic forms. The first derives its importance from its choice by some sociological students as an example of a certain inner determined evolution, or a scheme which the assumed unfolding of social life was ordained to follow. Now, our studies have made clear that no such unfolding has taken place in this region, but that we have a rather highly developed system of coördinated societies in a few central tribes with various remnants among the marginal groups, seemingly best explained by assuming that some one or two of the central group constructed or invented these schemes of organization and that others copied from them to a greater or less degree. Thus it is probable that the results of this phase of our year's work will be of some general theoretical importance aside from the accumulation of new knowledge concerning the tribes in question.

The study of ritualistic forms has also a theoretical interest because we find a strong tendency for each group of Indians to conserve one more or less individual type of ritualistic ceremony. This is only now apparent since we have fairly complete data on all the many rituals still known among a few tribes. It remains to work out a comparative view of these types. Waiving this theoretical problem, we have resulting collections of systematically recorded data which will in a few years be unavailable except in our field notes. Perhaps few realize that in North America the Indian is no longer leading a life different from that of his white neighbors and information as to his former life is to be had only from a few old people who will pass into the beyond within a few years.

During the year the Chipewyan, Cree and Sarsi of Canada were visited; also the Menomini, Crow, Hidatsa, Mandan, Santee, Dakota, and Teton-Dakota of the northern Plains; and the Kiowa Apache and Jicarilla Apache of the Southwest; all in connection with the above coördinated investigation. In addition, some other special investigations were undertaken. Mr. Max Schrabisch is exploring the out-of-the-way corners of New Jersey for rock shelters used by prehistoric man. This work has proved them to be rather numerous and to have in them traces of different culture levels, a feature so far rare in North America. Mr. W. S. Taylor visited the Tlingit of Alaska for studies in form and color to be used in his series of mural sketches illustrating certain phases of North Pacific culture — pictorial habitat groups they may be called. In the field Mr. Taylor was assisted by Lieutenant G. T. Emmons.



## HARLAN I. SMITH: EXPLORER IN ARCHÆOLOGY

**M**R. Harlan I. Smith, recently severed his connection with the Museum as Associate Curator in Anthropology, to accept the appointment as official archaeologist to the Canadian Government and Curator of the division of archaeology in the Victoria Provincial Museum. He has been connected with the American Museum since his appointment as Assistant in Archaeology in 1895.

During his long and efficient services in this Museum, Mr. Smith was identified especially with the Jesup North Pacific Expedition for whose archaeological work he was mainly responsible. His first important work was in British Columbia in the valley of the Thompson River. Here he made extensive excavations at Spences Bridge, Kamloops and Lytton, discovering numerous remains of previous habitations, some of which were without doubt of considerable antiquity. Almost all his finds at these places antedated the advent of the whites and gave an excellent insight into the culture of the people of that early period.

Later, he extended his investigations to the shores of Puget Sound and made a special exploration of the shell-heaps in the Fraser Delta. This work was followed by an extensive exploration of the Columbia River valley especially in the Yakima district. His investigations as a whole, seem to indicate a prehistoric movement of the interior plateau people of British Columbia out to the Pacific coast. The results of this series of investigations have appeared in the *Memoirs of the Jesup North Pacific Expedition* as follows: "Cairns of British Columbia and Washington"; "Shell-Heaps of the Lower Fraser, British Columbia"; "Archæology of the Gulf of Georgia and Puget Sound"; "Archæology of the Thompson River Region"; and the "Archæology of Lytton, British Columbia"; and also in the *Anthropological Papers*: "The Archæology of the Yakima Valley."

While preparing for the press the above publications he became greatly interested in what he has designated as "an unknown field in American archæology." To use his own words: "Nothing is understood of the life of the prehistoric people, the direction from which they came, or when they arrived, in a portion of the United States and Canada larger than all the rest of those countries. This area stretches from the Gulf of Mexico to the Arctic Ocean and occupies most of the country between the Mississippi Valley and the Coast Range. It includes the Mackenzie basin, the Barren Lands and the Great Plains. In the United States, eastern Washington, Oregon, and California, all of Idaho, Montana, Wyoming, and Nevada, northern Utah and Colorado, all of Texas but the eastern edge, most of Oklahoma, Kansas, and Nebraska and the western part of the Dakotas belong to this region which we may popularly term 'darkest archæological

America.' " He was profoundly impressed with the almost absolute lack of archaeological knowledge concerning this territory, in contrast with the very great contemporary general interest of ethnologists and the acknowledged importance of archaeological data to supplement the results of their investigations. He was further stimulated to take up work in this region because of the somewhat primitive character of the few archaeological remains so far reported.

In 1907 he began explorations in this field, starting in at the southern boundary of Wyoming. The northern and eastern parts of the state were visited the following year where he made important discoveries of prehistoric quarry sites as well as other important traces of prehistoric races. A preliminary report of these investigations was published in the *Bulletin of the American Geographical Society*, July, 1910.

For the Museum to do without Mr. Smith's services is a distinct loss but since he was the first to develop the archaeology of western Canada and perhaps the first to do serious systematic work in that field, he was the logical man to take up the problem when the Canadian Government felt ready to give the subject especial inquiry.

### COLLECTING FOSSIL FISHES IN OHIO

*By Bashford Dean*

**D**URING the summer of 1911 the Department of Fishes and Reptiles arranged for its Associate Curator, Dr. Louis Hussakof, to visit the localities in Ohio which had yielded rich finds in fossil fishes — an expedition made possible through the Cleveland H. Dodge Fund. It was from these localities that many forms of Devonian fishes had been obtained, which were described in early papers of Professor J. S. Newberry, and which have ever formed a lengthy and important chapter in the ancient history of fishes.

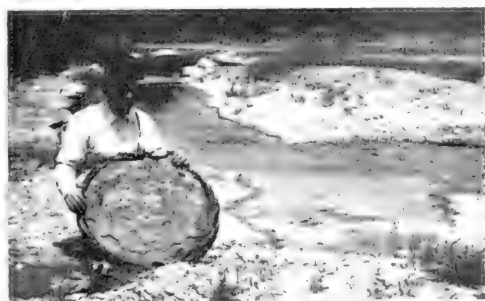
The forms from Ohio included mainly huge creatures whose head and shoulders were closely covered with plates of bone and whose dentition showed that they were easily the dominant animals of their early age. Unfortunately in spite of numerous earlier collections, few details could be discovered to show clearly what kind of animals these "placoderms" really were, or to make clear their lines of evolution, and it was hoped that a renewed exploration of the classic localities would yield material which in later years had become weathered out of the banks of shale and that from these specimens one could obtain additional light on the problem of these fishes. Dr. Hussakof accordingly made a tour of the state, visiting Cleveland, Lorain, Delaware and Sandusky, with a short excursion into Kentucky,

where a somewhat similar formation occurs. He obtained information in regard to local collectors, and was able himself to gather a large number of specimens.

The collecting in the Ohio fields is by no means an easy task. One of the best-known localities has been overgrown by the city of Cleveland. The fossils occur in the core of slaty concretions which appear sparingly scattered in the soft black Devonian shales of that locality. These crumble almost like sand and are weathered away during the changes of spring and fall, exposing here and there great flat concretions usually of circular outline. Where the shales are deeply cut down by the waterways concretions may be found jutting out of the banks, but in such positions they cannot readily be obtained until by continued weathering they have dropped into the bed of the stream. On the other hand, where the shales lie over large surfaces the concretions can readily be examined. Only rarely however do they contain well-preserved fossils. About fifty concretions containing fossils were brought to the laboratory of the department and will be worked out during the present winter. It is hoped that they will furnish important data for the understanding of these enigmatic fishes.



Ohio is a classic field for the discovery of Devonian fossil fishes. One of the best-known localities has been overgrown by the city of Cleveland. The fossil fishes of Ohio were mainly huge creatures whose head and shoulders were covered with plates of bone



The fossils occur in the core of slaty concretions, usually flat and circular, formed by the weathering away of the soft shales

## NEWLY DISCOVERED CAVERN IN THE COPPER QUEEN MINE

*By Edmund Otis Horey*

THE great Copper Queen mine at Bisbee, Arizona, is most famous for the millions of tons of high-grade copper ore which have been taken from it, but it is likewise well known for the beautiful, though small caves that have been encountered in it from time to time in the course of the regular mining operations. These caves have for the most part been found in the limestone of Queen Hill, the eminence that forms the southwest wall of Tombstone Cañon at Bisbee. One of the caverns broken into during the active life of the old Queen Incline, almost in the heart of the city, twenty or twenty-five years ago furnished the wonderful green and white curved and ordinary stalactites and the stalagmites that adorn the Gem and Mineral Halls of the Museum.

There is therefore small cause for wonder that I was much interested in the report of the finding of this new cave. The word reached my ears immediately on my arrival at Bisbee, where I had gone with three men to collect the data needed in the construction of the great Copper Queen model which is being made for the Museum through the generosity of a friend of the institution. The cave had been discovered some months before, but immediate steps having been taken to control access to it, its rooms and their formations were still in their pristine perfection and beauty.

Having donned regulation mine costumes early one morning, we started for the underground cavern. After descending the Czar shaft two hundred feet to the "second level" we walked southwestward toward a point almost directly beneath the summit of Queen Hill. A quarter of a mile or more — it seemed at least a mile — from the big shaft we came to the foot of a "raise," up which we were drawn four hundred feet by an electric hoist. The journey from the shaft along the level through solid limestone had been cool and comfortable, but as we went up the raise both the moisture and temperature of the air increased, because we had entered the "leached ground" where the oxidation of the original ores produced heat, just as does burning coal. A few yards from the raise we reached the top of a "manhole" cut through the heating ore. Now it was necessary to climb forty feet down vertical ladders to the heavy plank door that guarded the cave.

Squeezing through a small hole beyond the doorway, we found ourselves at the bottom of the cave in a small room whose ceiling scarcely permitted one to stand erect. The bright light of our acetylene mine lamps showed that the room was lined with alabaster, tinted a delicate green with carbonate of copper. Walls and ceiling were comparatively smooth but incrust-



The large room (thirty feet high and forty feet across) of the cave was one of the most beautiful sights imaginable in the brilliant illumination of our acetylene mine lamps. Its chief feature was the great greenish white stalagmite (fourteen feet high) rising at its upper end, so impressive in size and setting, so beautiful in outline, ornamentation and surroundings that it seemed little short of vandalism to destroy or mar it, or any part of the cave which it adorned, although in the interests of science

with minute crystalline surfaces that glittered in the rays from our lamps, while the floor was uneven with knobby clusters of calcite, and held here and there a shallow pool of limpid water. The upper exit from this first chamber was almost closed with great blocks of rock that fell from the ceiling so long ago as to have received their own coating of dripstone. Worming our

way upward among these for a few yards, we emerged into a clear chamber fully thirty feet high and forty feet across. The floor rose at a steep angle and its coating became part of the base of a great stalagmite.

This large room was one of the most beautiful sights imaginable in the brilliant illumination of burning magnesium ribbon. Its floor was a thick mass of dripstone, its walls were partly smooth white calcite and partly, toward the top, the deep velvety brown, red and black of the iron- and manganese-stained residue of the decomposed country limestone, while the ceiling was mainly of the limestone but banded with sheets and small stalactites of calcite. These occurred along the old cracks in the mountain mass, which formed the channels for percolating waters, an important factor in the formation and incrustation of the cave. The lower part of the walls was thickly covered with botryoidal clusters of white calcite, some areas of which were tinted a delicate salmon color with carbonate of manganese.

The chief feature of the room was the great greenish white stalagmite rising at its upper end and reaching almost to the ceiling. So impressive in size and setting, so beautiful in outline, ornamentation and surroundings was this wonderful object that it seemed to us little short of vandalism to destroy or mar it, or any part of the cave which it adorned, although in the interests of science or the necessities of mine operation. This stalagmite is about fourteen feet high above the shelf of limestone on which it stands and its diameter at the same point may be taken as being fourteen or fifteen feet. Three feet above the shelf the column is ten feet through. Stalagmite is of extremely slow growth and even under the more favorable conditions prevailing at Luray Cave, Virginia, where measurements have been made, such a mass would have required more than 67,000 years to form; hence it is safe to assume that this cavity in the Queen Hill has had its present size and shape for a much longer period than that, since the rainfall is less and the consequent solution slower in Arizona than in Virginia, though evaporation and consequent deposition are conversely more rapid in Arizona. The stalactite growth above this stalagmite was insignificant.

Climbing up the congealed waterfall forming a smooth apron in front of and below the stalagmite, we passed to the left of the column over a floor carpeted with coarse botryoidal clusters of calcite and clambered through an opening in the black rock into a room that might be considered the fourth story of the cave. Immediately at our right was a compound stalactite which our miner associates promptly called the "elephant's ear," while a few feet beyond was a remarkable stalagmite three feet in diameter and rather more than three feet high, which with its smaller stalactite and its accompanying crystal-covered floor and wall formed a charming grotto.

This stalagmite was noteworthy on account of the radiating clusters of pointed calcite thickly set all over it but diminishing in size from the bottom of the column upward. It has been commonly held that such crystals could be formed only under water, but conditions here indicate that there has been no submergence or filling of the cave since it was formed and we must conclude that in a region of extremely rapid evaporation crystals will grow from a solution flowing over a surface.

The upper wall of this room was formed by a great block of fallen rock which has received the drippings of a lime-bearing watercourse. Stalagmite was formed on its top, while ribs of calcite, some of which were complete lines of crystal tufts, projected close together from its sides. Narrow, drip-stone-lined passages on either side of this block led to a series of three small rooms one above another, the last of which was so low that an adult could hardly squeeze his way into it. These upper rooms were characterized by abundant stalactites and practically no stalagmites, contrasting with the conditions in the lower rooms where the stalagmites predominate at the expense of the stalactites. One of the most beautiful small features of the cave was the occurrence on the walls of one of the upper rooms of long acicular crystals of delicate green calcite grouped paintbrush fashion on small botryoidal masses of the same material. The cave extended up slopes averaging thirty degrees, through a vertical distance of about eighty feet and nowhere exceeded forty feet in width and thirty feet in height.

Inasmuch as the cave was doomed to ruin through mining, the company generously furnished the men and the means for removing at infinite pains the grotto and such other formations as we desired, and for transporting them to New York. This material is now at the Museum and there will soon be in place and on exhibition a reproduction of this most beautiful underground chamber.

### MUSEUM NEWS NOTES

THE following have been elected recently to membership in the Museum:

*Fellow*, MR. JOHN A. GROSSBECK;

*Life Members*, DR. ARNOLD KNAPP, MESSRS. ANTHONY N. BRADY, FREDERICK F. BREWSTER, HAROLD J. COOK, FRANCIS R. HITCHCOCK, HENRY LANG, JOSEPH J. NUNAN, JOHN J. PIERREPONT, CHARLES DE RIHAM, EDWARD W. SHELDON, HENRY ATTERBURY SMITH, MMES. GEORGE C. CLAUSEN, CHARLES W. HARKNESS, JAMES J. HIGGINSON, DANIEL S. LAMONT, JAMES ROOSEVELT, JACOB H. SCHIFF, CHARLES STEWART SMITH, H. P. WHITNEY, MISSES HELEN HURD, ROSAMOND PINCHOT, and MASTERS VARICK FRISSELL and GIFFORD PINCHOT, 2d;

*Sustaining Members*, MR. NELSON W. GREENHUT and MRS. GEORGE W. PERKINS;

*Annual Members*, RT. REVS. WILLIAM CROSWELL DOANE and WILLIAM LAWRENCE, REV. W. T. CROCKER, COLS. OSMUN LATROBE and ROBERT B. WOODWARD, DRS. JOHN ASPELL and ERNEST V. HUBBARD, MESSRS. PAUL BAERWALD, M. W. BENJAMIN, HENRY J. BERNHEIM, B. G. BRAINE, EDMUND M. BRENNAN, FRED T. BUSK, JAMES G. CANNON, BENNO COHEN, MAX COHEN, HERMANN CONHEIM, W. R. CROSS, LORENZO DANIELS, J. R. DELAMAR, O. L. DOMMERICH, MORRIS DWORETZKY, JAMES M. EDER, NEWMAN ERB, HENRY ESBERG, S. A. FATMAN, WALTON FERGUSON, LOUIS L. FIRUSKI, PLINY FISK, ISAAC D. FLETCHER, THOMAS POWELL FOWLER, MORTIMER J. FOX, ALEXANDER VON GONTARD, PERCY T. GRIFFITH, M. GRUNDNER, MORITZ HILDER, CHARLES W. HOFFMAN, CLARENCE J. HOUSMAN, EDWIN S. KASSING, OTTO KAUFMANN, FRED T. KELLERS, JAMES GORE KING, HERBERT R. LIMBURG, THOMAS J. MCBRIDE, ROBERT H. MCCURDY, E. A. MCGUIRE, EDWIN G. MERRILL, JULIAN H. MEYER, E. D. MORGAN, ELAM WARD OLNEY, PHILLIPS PHOENIX, J. HARSEN PURDY, WILLIAM B. ROGERS, S. S. ROSENSTAMM, THOMAS SMIDT, PIERRE J. SMITH, HOWARD TOWNSEND, FRANK A. VANDERLIP, J. TROWBRIDGE VREDENBURGH, A. WIEDENBACH, WILLIAM G. WILLCOX, MMES. CHARLES B. ALEXANDER, GEORGE BLAGDEN, JOSHUA S. BRUSH, C. H. COSTER, CHARLES D. DICKEY, H. WINTHROP GRAY, HENRY W. HARDON, J. B. FRANCIS HERRESHOFF, CHRISTIAN A. HERTER, JOHN S. KENNEDY, E. H. LANDON, AGNES LATHERS, AMORY LELAND, PAYSON MERRILL, FREDERICK PEARSON, STEPHEN PELL, HENRY PHIPPS, N. T. PULSIFER, CHARLES CARY RUMSEY, JAMES SPEYER, BENJAMIN STRONG, HENRY W. TAFT, MISSES ADDISON MITCHELL and ELVINE RICHARD.

CAPTAIN W. H. COTTINGHAM, MR. HAROLD J. COOK and MR. JOSEPH J. NUNAN have recently been elected Life Members in recognition of services rendered to the Museum's field parties in Alberta, Nebraska and British Guiana respectively.

MR. STEFÁNSSON of the Museum's Arctic Expedition reports a very interesting discovery of an archæological nature at his last winter camp near Pt. Stivens, Parry Peninsula. According to his report a great deal of pottery is found upon old village sites, some at a depth of several feet. This pottery is of similar type to that found among and lately manufactured by some of the Alaskan Eskimos. Pottery has so far not been reported from any of the Central and Eastern Eskimos. It was formerly assumed that the presence of pottery among the Alaskan Eskimos was to be explained as indicating forms copied from Siberian or neighboring American tribes. The



recent discoveries of Mr. Stefánsson have made it certain that this cannot be the true explanation and that the art of pottery among the Eskimos must have been of ancient origin and at one time very widely distributed. Furthermore Mr. Stefánsson reports that other objects he finds are similar in type to those described by Professor Boas, discovered by Captain George Comer in ancient village sites in Southampton Island, Hudson Bay. These were also similar to objects recently discovered in Greenland, leading to the conclusion that older types of Eskimo culture must have been much more uniform throughout the entire stretch of Arctic America than at present. Mr. Stefánsson's find of similar objects on the west side of Hudson Bay makes it more probable that there was formerly but a single type of Eskimo culture from Alaska to Greenland.

THE Museum has received from Mr. J. A. Grossbeck a gift of some twelve thousand specimens of *Geometridæ*. In recognition of this interest in the Museum Mr. Grossbeck was elected a Fellow by the Executive Committee at a recent meeting.

IN 1910 Mr. Roy C. Andrews spent seven months in Japan, studying and collecting specimens at the whaling stations. Not only did he secure a large amount of valuable data as to the anatomy and life histories of various species of cetaceans, but also sent to the Museum the skeletons of six whales and ten porpoises. There still remain however two species of large whales, the California gray and the humpback, of which specimens could not be secured.

The California gray whale (*Rachianectes glaucus*), in Japan called the "devil fish" or "Koku kujira", is to the systematist one of the most interesting of all cetaceans, combining as it does, characters common to both the families of baleen whales. Moreover, it has never been carefully studied and there is little reliable data extant relating to its habits and external anatomy. No museum in America possesses a complete skeleton of this species, and the only places where the animals are being taken in numbers is at the stations of the Toyo Hogei Kabushiki Kaisha in southern Korea. To study and collect specimens of this whale is the object of an expedition which left the Museum for Korea on November 28. After spending some two months at the whaling stations, Mr. Andrews will go into the northern mountains. The region is said to be one of dense forests seldom cut by trails, and exceedingly difficult to penetrate. Both mammals and birds will be collected.

ON November twenty-first, Dr. F. E. Lutz and Mr. C. W. Leng returned from a three weeks' expedition into southern Florida to collect material

for the Department of Invertebrate Zoölogy. This region is particularly interesting on account of its close similarity to northern South America and because it is essentially different in ecological respects from northern Florida.

LAST summer the attention of Dr. E. O. Hovey was called to the existence in the town of Russell, St. Lawrence Co., New York, of a perfect glacial pot hole two feet in diameter and four feet in depth. Pot holes are pot-shaped cavities carved in the rock of a stream bed by the swirling of water carrying stones, a "glacial" pot hole being one formed beneath a glacier. They are common enough in nature, but it is rather seldom that good ones can be collected and brought to a museum.

The present specimen was in a ledge beside a road where the rock containing it could be quarried. The rock is crystalline limestone of Archæan age, containing much flint. Arrangements for cutting out the block were made with the Gouverneur Marble Company and the company sent a channeler and a gadder from Gouverneur to the pot hole, a distance of about twenty miles, together with a crew of their best men to do the work. It was found necessary to cut out a block six feet square and six feet high. After three weeks of hard work this was accomplished and now the block, crated and ready for transportation and weighing about ten tons, stands beside the road, waiting for winter to come and render the use of a sled practicable for transferring the specimen to the railway station, five miles away.

THE Panama Canal project is illustrated at the north end of the Hall of Geology by means of a relief map of the Isthmus, a collection of specimens of earth and rock from the most interesting places along the canal, and a series of photographs to show the process of excavation and construction.

MR. ERNEST VOLK of Trenton, N. J., has just rearranged the Museum's exhibit of evidences of the antiquity of man in New Jersey. For twenty-five years Mr. Volk under the direction of Professor F. W. Putnam has carefully searched the glacial gravels and the upper strata for signs of man, and deposited the earlier collections in this Museum. The exhibit shows human bones from the glacial gravels that probably represent the oldest known human being in America and also skeletons and stone implements from undisturbed portions of the layer of yellow soil above the gravels. While it is not claimed that the remains are as old as any so far found in Europe, it cannot be denied that they are as old as the strata in which they occur. The exhibit is installed in the South American Archæological Hall, second floor west.

DURING the past summer Mr. Walter Granger continued the systematic exploration of the Eocene mammal beds commenced in 1903 with the exploration of the Bridger Basin, and continued in the Washakie, Wind River and Big Horn Basins. He secured this year another valuable collection of Lower Eocene fossils including many rare specimens. Through its expeditions the Department of Vertebrate Paleontology is acquiring the materials for a complete history of the Eocene mammals of North America. In some respects it is a more complete record than had been anticipated, for the more careful and thorough stratigraphic work has shown that the formations of the different basins, instead of being successive in point of time, with gaps between them unrepresented by any fossil-bearing formation, are in point of fact overlapping to an unexpected degree, so that by combining the records of the different basins we obtain a nearly complete record of Eocene life history in that region. On the other hand the accurate records now kept of the exact level of each specimen have proved that the evolution series is less continuous and gradual than had been anticipated. New stages in most races appear suddenly and displace the old ones, either immediately or little by little, instead of gradually evolving out of them. This fact may be explained in one of two ways. Either the new stage has been gradually evolved in some other region and reached here by migration; or it evolved not gradually but by sudden changes or "sports" — the method of evolution advocated in recent years by De Vries and others. The careful study of Mr. Granger's collections will supply very important evidence on this problem.

## LECTURE ANNOUNCEMENTS

### MEMBERS' COURSE

The first course of lectures for the season 1911–1912 to Members of the Museum and to persons holding complimentary tickets presented to them by Members will be given in November and December. These lectures deal chiefly with the Museum's explorations of 1910–1911 and will be fully illustrated by stereopticon. Two only of these lectures remain to be given.

Thursday evenings at 8:15 o'clock. Doors open at 7:45.

December 7 — MR. FRANK M. CHAPMAN, "A Natural History Reconnaissance in Colombia."

Mr. Chapman entered Colombia at Buenaventura on the Pacific Coast, crossed the western range of the Andes into the Cauca Valley, then went down the Cauca River to the northern end of the valley and crossed the Central Andes to the Magdalena River, which he followed to the Caribbean. This journey of 1500 miles, through a country of great beauty, was made to secure material for a Habitat Group of Birds in the Tropical American Series and as a reconnaissance in the Museum's proposed biological survey of the Cauca Region of Colombia.

December 14 — DR. CHARLES H. TOWNSEND, "The Voyage of the Fisheries Steamship Albatross to the Gulf of California."

A popular account of an expedition in which the American Museum of Natural History, the New York Zoölogical Society, the New York Botanical Gardens and the National Museum at Washington coöperated with the U. S. Bureau of Fisheries. The scientific results of the voyage in oceanography, in the fisheries, and the general biology and botany of the coastal regions of Lower California will be presented. Deep-sea dredging was carried on successfully to a depth of two miles. Large collections of mammals, birds, reptiles and plants were secured.

#### PUPILS' COURSE

These lectures are open to the pupils of the public schools when accompanied by their teachers, and to children of Members of the Museum on presentation of Membership tickets.

Dec. 6 — MR. A. E. BUTLER, "The Rocky Mountain Region."

Dec. 8 — MR. J. A. GROSSBECK, "Insects Useful and Harmful to Man."

#### PEOPLE'S COURSE

*Given in coöperation with the City Department of Education*

Tuesday evenings at 8:15 o'clock. Doors open at 7:30.

The last two of a course of lectures on "Great Classical and Romantic Composers" by MR. DANIEL GREGORY MASON. Illustrated at the piano.

December 5 — "Felix Mendelssohn-Bartholdy."

December 12 — "Frederic Chopin."

Saturday evenings at 8:15 o'clock. Doors open at 7:30.

The last three of a course of lectures, "From the Rhone Glacier to the Pillars of Hercules; Courtly Provence and Romantic Spain," by PROFESSOR CHARLES U. CLARK of Yale University. Illustrated by stereopticon views.

December 2 — "Madrid."

December 9 — "Cordova and Grenada."

December 16 — "With Roman and Moor in Andalusia."

#### LEGAL HOLIDAY COURSE

Fully illustrated. Open free to the public. Tickets not required.

Lectures begin at 3:15 o'clock. Doors open at 2:45.

December 25 — DR. LOUIS HUSSAKOF, "Behind the Scenes in a Natural History Museum."

January 1 — MR. ALBERT E. BUTLER, "Travels in the Rocky Mountain Region."

February 22 — PROFESSOR HENRY E. CRAMPTON, "In the Wilds of British Guiana and Brazil."

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